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MENINGOCOCCAL INFECTIONS IN INFANCY AND CHILDHOOD.[1]

PART I. MENINGOCOCCAL MENINGITIS: A REVIEW OF 117 PATIENTS TREATED WITH SULPHAPYRIDINE.

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THE greatly improved prognosis in meningococcal meningitis with sulphonamide therapy, especially if treatment is instituted promptly, makes it imperative that the clinical manifestations of the disease in infancy and childhood should be thoroughly appreciated. This paper aims primarily at discussing the clinical aspects and the results of treatment by sulphapyridine of meningococcal meningitis in infancy and childhood as observed in a series of 117 patients admitted to the Children's Hospital, Melbourne, from January, 1939, to August, 1942. Secondarily, it is proposed to compare progress in treatment with sulphonamides with the results obtained with specific serum. My knowledge concerning the 117 patients treated with sulphapyridine is derived from personal management of the majority during the years when I was medical superintendent at the Children's Hospital, Melbourne. The facts and figures relating to serum therapy have been obtained from a close analysis of the case records of 74 patients treated with serum at the Children's Hospital from June, 1926, to July, 1938. Studies of the concentration of sulphapyridine in the cerebro-spinal fluid have been conducted.

Mortality Rate and Causes of Death.

The number of children suffering from meningococcal meningitis admitted to the hospital from January, 1939, to August, 1942, was 120; in all cases with the exception of nine, the existence of the disease was proved bacteriologically, and in these nine cases the diagnosis was based on clinical grounds. The cerebro-spinal fluid was purulent in each of these nine cases, but attempted culture of the fluid by ordinary laboratory technique was unsuccessful in yielding a growth of organisms. The rapid improvement produced clinically by sulphapyridine treatment and the presence of a rash in some patients, leave little doubt that the meningococcus was the bacterium causing the meningitis. During the later part of the year 1940, and throughout the years 1941 and 1942, cerebro-spinal infections and meningitis reached epidemic proportions in Melbourne and the surrounding districts. Fifteen deaths are to be recorded among the 120 patients, but three of the fifteen deaths occurred before adequate treatment could be instituted—in each case, within two hours of the patient's admission to hospital. These three patients are therefore excluded, and there remains a series of 117 patients with twelve deaths—a mortality rate of 10·2% (see Table I).

Deaths have been classified according to the following pathological causes: firstly, septicæmia and meningitis with circulatory failure; secondly, purulent meningitis; thirdly, post-basic meningitis with hydrocephalus; and fourthly, associated complications. Six of the twelve deaths were the result of a severe infection with septicæmia, meningitis and circulatory failure; no less than four of the six deaths occurred within a period of two months during the peak of the 1941-1942 epidemic. These six patients varied in age from eight months to twelve years; all had become acutely ill over a period of from twelve to forty-eight hours, and all presented with clinical evidence of meningitis and profound toxæmia associated with circulatory failure. No response to treatment was observed clinically at any stage, the general condition steadily deteriorated, and death ensued usually in twelve to twenty-four hours from the time of admission to hospital. Post-mortem examination disclosed the presence of toxic changes in all organs and tissues; petechial hæmorrhages were frequently noted, particularly in mucous membranes and under serous surfaces. Little or

[1] The second part of this paper will be published in the next issue of the journal.

TABLE I.

Mortality Rate and Causes of Death among 117 Infants and Children Suffering from Meningococcal Meningitis and Treated with Sulphapyridine, from January, 1939, to August, 1942.

Cause of Death.	Number of Deaths.	Mortality Rate. (Percentage.)
Septicæmia, meningitis and circulatory failure	6	5·1
Purulent meningitis	1	0·86
Post-basic meningitis with (i) Hydrocephalus .. .. (ii) Pyocephalus	3 1	3·4
Medullary and sub-arachnoid hæmorrhage	1	0·86
Totals	12	10·2

TABLE II.

Relationship of Mortality Rate to Age in 117 Infants and Children Suffering from Meningococcal Meningitis Treated with Sulphapyridine from January, 1939, to August, 1942.

Age.	Number of Cases.	Number of Deaths.	Mortality Rate. (Percentage.)
Under six months ..	31	6	19·4
Six months to one year	10	1	10·0
One to three years ..	27	2	7·4
Three to fourteen years	49	3	6·1
Totals	117	12	10·2

no inflammatory reaction was observed in the brain or meninges, intense hyperæmia and œdema with some small petechial hæmorrhages being the only constant pathological changes detected; fibrino-purulent exudate was either absent or extremely scanty. Both pathological and clinical observations suggested that death was the result of severe toxæmia and circulatory failure, the meningeal inflammation *per se* being but a facet in the general disease process.

An extensive fibrino-purulent meningitis occasioned the death of one infant, aged seven weeks, who had been ill for three days prior to admission to hospital; death resulted three days after admission to hospital, the infant showing little or no improvement at any stage during treatment. Post-mortem examination disclosed a thick, extensive, fibrino-purulent exudate covering the entire cortex of the brain, the exudate being particularly thick around the blood vessels and nerves in the region of the base of the brain.

Post-basic meningitis with hydrocephalus in three infants and a pyocephalus in one were the factors responsible for death in four cases. Three were infants under the age of six months, the fourth being a girl, aged eight years. All had been ill for several weeks prior to the establishment of the diagnosis of meningitis, and all died within several weeks, death being the result of either an acute hydrocephalus or an acute pyocephalus. In all of these four patients the cerebro-spinal fluid had been rapidly rendered sterile, as determined by bacteriological examination after a period of two or three days' treatment, and the inflammatory reaction in the brain and meninges had subsided satisfactorily, as judged by the small number of cells in the cerebro-spinal fluid. Death appeared to be due mainly to mechanical factors brought into operation by delayed resolution and organization of the inflammatory exudate; obstruction of the ventricular system resulted and caused a gross imbalance of intracranial pressures. Post-mortem examination disclosed adhesions in the basal regions of the brain, more particularly in the vicinity of the fourth ventricle.

One of the twelve deaths was due to a large subarachnoid hæmorrhage in the posterior fossa; the source of this hæmorrhage was most probably one of the medullary vessels, which at the same time caused a large medullary and cerebellar hæmorrhage. This infant had been ill with posterior basic meningitis for a period of seventeen days before treatment was instituted. Death occurred suddenly and unexpectedly nine days after the commencement of sulphapyridine therapy, progress up to that time being regarded as satisfactory.

The relationship of age to mortality rate is both interesting and instructive. Seven of the twelve deaths occurred among infants aged under one year, no less than six of these being under the age of six months (see Table II). The percentage mortality rate in each group is also shown and it is very evident that the younger the infant or child, the greater the mortality rate, which may be stated as 19·4% in infants aged under six months and 6·1% in children over the age of three years. Babies between the ages of six months and three years occupy an intermediate position.

The age relationship to the pathological condition at autopsy is very striking. Post-basic meningitis with hydrocephalus was almost limited to infants, only one child, aged eight years, having this condition.

This girl had been ill for three weeks with headache, pain in the neck and a rash, symptoms which had been attributed to an infective purpura of indeterminate ætiology. Convulsions at the end of the third week led to the establishment of a diagnosis of meningitis. The cerebro-spinal fluid was turbid and yellowish in appearance and provided a growth of meningococci. Sulphapyridine therapy rapidly rendered the cerebro-spinal fluid sterile, and the meningitis (as judged by the low cell count of 120 mononuclear cells per cubic millimetre six days after treatment, and 31 mononuclear cells per cubic millimetre twenty-one days after treatment) appeared to have subsided satisfactorily. However, in spite of this improvement, the child's mental condition deteriorated, and radiological examination of the skull, examination of the *fundus oculi* and a lumbar puncture revealed a considerable increase of intracranial pressure. Death occurred suddenly from acute hydrocephalus seven weeks after her admission to hospital.

A similar clinical history of delayed diagnosis was obtained in the case of the other three infants with hydrocephalus. The rather less acute type of inflammation in infants, together with the greater difficulties in establishing diagnosis, are two reasons why post-basic meningitis is particularly prone to occur in babies. Delayed treatment therefore means delayed and incomplete resolution of the exudate. Acute septicæmia and meningitis with circulatory failure may occur at any age from six months to thirteen years. It is curious that infants aged a few weeks apparently escape the very severe type of meningeal infection; but they may develop severe and fatal septicæmia.

Clinical Features of Meningococcal Meningitis.

The clinical picture of meningococcal meningitis varies considerably in different patients; the age of the patient and the acuteness of the meningeal inflammation are two important factors responsible for this variation. Both older children and adults are uncommonly affected by the disease at times other than those of epidemics, the disease in the endemic phases being practically limited to infancy. During epidemic phases, largely owing to an enhanced virulence of the meningococcus, the meningeal reaction is much more acute in the major proportion of patients, and this factor produces a different symptom complex. However, even in epidemic periods the meningeal inflammatory reaction in infants aged under six months tends to be less acute than in older children. The clinical features of the disease in infancy are frequently so different from those in older children that a separate description is warranted.

In infancy no definite set of symptoms or signs is pathognomonic of the disease, and at times it is very difficult to establish a diagnosis. Drowsiness and irritability are two outstanding features, and with them is frequently associated vomiting; both mother and doctor

may attribute these symptoms to a dietetic upset. Not uncommonly in the early stages of the illness the bowel motions may be loose, green and slimy, leading to a mistaken diagnosis of entero-colitis. Convulsions or twitchings are common at some stage of the disease; "screaming" attacks or intense restlessness or whimpering may occur, any measures that the mother may adopt being unsuccessful in pacifying the infant. Pallor is a sign that the mother may notice, and associated with any of the above symptoms is often significant. Strabismus may be noted in an illness of a rather chronic nature. The two most important physical signs are a bulging fontanelle, indicative of increased intracranial pressure, and some neck stiffness. Neither of these signs may be very definite, and frequently the latter is very difficult to elicit with any degree of certainty, particularly if the infant is irritable. Head retraction is an important sign; but it is frequently late in appearing and therefore of limited value in establishing an early diagnosis. A bulging fontanelle, neck stiffness, convulsions or twitchings occurring during an indefinite illness of several or more days' duration furnish very suggestive evidence of meningitis, and lumbar puncture is indicated. In contradistinction, these signs or symptoms are not of the same significance in the initial phases of an illness. A skin eruption frequently does not occur in infants, particularly in endemic periods, and even if present is often evanescent. I believe that the difficulty of early recognition of meningitis of the post-basic type in infants is due to the facts that frequently few symptoms are referable to the nervous system and meninges, and that the physical signs are often indefinite and difficult to elicit. Diagnostic lumbar puncture should be used more often than it is, and it is only by its aid and by keeping in mind the possibility of meningitis in an indefinite illness that early cases will be recognized.

Children aged over two or three years do not present the diverse clinical pictures so frequently encountered in infancy, and a diagnosis is more easily established. Headache and vomiting associated with irritability, drowsiness or delirium, or with a combination of these three symptoms, are the common initial symptoms. A small number of children have an initial shivering attack, although an actual rigor rarely occurs. Convulsions or twitchings are uncommon as compared with their frequency of occurrence in infants, but are usually significant. Joint pains, and sometimes swelling of a joint may occur, leading to a diagnosis of rheumatic fever. Aching pain in the back or neck may also give rise to complaint. Almost without exception the neck and spine are stiff, and frequently Kernig's sign is elicited. Head retraction is very variable, but is commonly present in the more acutely ill patients. As the majority of these patients become ill in epidemic periods, many have a skin eruption; there is considerable variation both in its type and in the length of time for which it is present. Sparsely scattered red macules or spots fading on pressure and lasting only a few hours, or a rather more dense eruption of these red macules, are two types encountered. A typical purpuric eruption, either densely or sparsely scattered, is frequently seen, and in contradistinction to the red macular type the red centres of these purpuric spots do not fade on pressure, although the periphery may do so. In the very acute or fulminating type of the disease, skin hæmorrhages of sizes varying from a few millimetres up to one centimetre or more in diameter may be encountered. It is worth recording that few patients with large skin hæmorrhages recover. Atypical variations of skin rashes may be seen, and at times a morbilliform eruption or a fine pin-point rash not unlike that of rubella has been noted.

The Treatment of Meningococcal Meningitis.

Treatment will be discussed under the following three headings: (i) measures directed towards the destruction of the meningococcus; (ii) measures directed towards correcting any disorder in the physiological working of the body—for example, dehydration, anoxæmia, circulatory failure; (iii) symptomatic treatment.

Measures Directed towards the Destruction of the Meningococcus.

Sulphonamide therapy has been a wonderful advance in treatment. In all of the 117 patients sulphapyridine has been the drug used, and experience has demonstrated that it is relatively safe, that it is tolerated well, and that the results of treatment are good. The dose is varied according to a number of factors such as (i) the acuteness of the illness, (ii) the age and size of the patient and (iii) the reaction to treatment, and therefore any given table of dosage must be varied considerably in actual practice. The dose administered on the first day is approximately double that administered on the second and third days. From the fourth to the sixth days the total daily dose is reduced by one-third of that administered on the second and third days; from the seventh to the tenth days the total daily dose is further reduced by one-third. Table III shows the daily average doses for children in different age groups; the total dosage over the nine or twelve days during which the drug is administered is also shown. The doses recommended are similar to those suggested by Banks[9] in 1939.

TABLE III.

Average Daily Dosage of Sulphapyridine (in Grammes) Administered to Infants and Children Suffering from Meningococcal Meningitis.

Age.	Dosage. (Grammes.) First Day.	Second and Third Days.	Fourth, Fifth and Sixth Days.	Seventh, Eighth, Ninth and Tenth Days.	Total Dosage over Ten Days.
Under six months ..	4	2–3	1–2	1	14–20
Six months to one year ..	6	3	2–3	1–2	20–26
One to two years	6–7	3–4½	2–4	1–2	26–32
Two to six years	7–9	4–6	3–4	2	32–38
Six to fourteen years ..	9–12	6	4–6	3	38–50

The majority of infants and children can swallow the drug quite well when it is crushed up in milk. Intravenous or intramuscular injection is reserved for dangerously ill patients in whom a rapid concentration of the drug in the cerebro-spinal fluid is necessary, and for those patients who vomit easily or who are unable to swallow. More often than not, a child or infant requiring sulphapyridine by a parenteral route requires continuous intravenous drip therapy with saline solution, and the soluble sodium salt of the drug is conveniently administered by the addition of the required amount to the saline solution. If the intramuscular route of administration is used, it is important that the drug be given right into muscle, as serious sloughing will occur if any of the drug should escape into the subcutaneous tissue. The outer side of the thigh is a safer and easier site for injection than the buttock, particularly in infants.

The therapeutic response to sulphapyridine is rapid. Clinically, the patients quickly improve and the cerebro-spinal fluid is rapidly rendered sterile, a growth of meningococci rarely being obtainable after thirty-six hours of treatment; in only one instance was such a growth obtained after forty-eight hours. Furthermore, the inflammatory reaction in the meninges, as judged by the cellular content of the cerebro-spinal fluid, rapidly resolves, for the number of cells is reduced from several thousand polymorphonuclear cells per cubic millimetre to several hundred cells in three or four days; of these cells an appreciable proportion are of the lymphocytic type. In ten to twelve days as a rule, only a few lymphocytes are found in the cerebro-spinal fluid.

Measures Directed towards Correcting any Disorder Caused by the Disease in the Physiology of the Body.

Dehydration is prone to occur in very ill children as a result of fluid loss from vomiting or from inability to ingest an adequate amount of fluid. A dangerous condition can readily be reached if an adequate fluid balance is not maintained. For patients who vomit profusely, and especially for severely ill patients with circulatory failure, continuous intravenous therapy with saline solution is imperative. For the less severely ill patients, any additional fluid that is necessary may be administered by the rectal drip method. This method is valuable, although its use is confined to older children, as infants almost invariably reject fluid administered in this manner. The fluid requirements of children can be easily estimated from the following data:

Infants aged under twelve months require 750 cubic centimetres per day.
Infants aged twelve months to one year require 900 cubic centimetres per day.
Children aged two years to six years require 1,500 cubic centimetres per day.
Children aged six years to fourteen years require 2,000 cubic centimetres per day.

These are minimum amounts in health, and any extra fluid lost from vomiting or diarrhœa or from reduced fluid intake prior to the patient's admission to hospital must be made up. The relief of dehydration is best assessed by the improved clinical condition of the patient and by his passing of an adequate quantity of urine of a moderately low specific gravity.

Acute dilatation of the stomach has occurred in a number of the patients suffering from severe toxæmia. Relief has been obtained in several of these instances by the passage of a fine Rehfuss tube through the nose into the stomach and the maintenance of continuous aspiration. Acute dilatation of the stomach with vomiting of blood-stained fluid is to be interpreted as a sign of serious significance.

Circulatory failure, the result of severe toxæmia, is a dangerous complication, and if it persists over twelve to twenty-four hours is usually fatal. Continuous oxygen therapy by means of two nasal catheters is of definite value, and continuous intravenous therapy with saline solution also helps. Neither of these measures produces any appreciable benefit in the more fulminating illnesses; the condition of the patient steadily deteriorates and death ensues usually within twenty-four to thirty-six hours. Other measures, such as the administration of "Neosynephrin", "Coramine" or other circulatory stimulants, have not been beneficial.

Increased intracranial pressure may be a factor in causing irritability, extreme restlessness, coma or convulsions. Should the above-mentioned clinical symptoms be present, and should their probable cause be considered to be increased intracranial pressure, lumbar puncture is indicated. The only other necessity for lumbar puncture is for purposes of diagnosis—firstly, to establish the diagnosis of meningitis, secondly, to be certain of cure after cessation of therapy on the tenth or twelfth day, and thirdly, to gain information of the meningeal reaction should clinical progress be unsatisfactory.

Symptomatic Measures.

Vomiting of patients, other than those suffering from severe toxæmia, is uncommon. Both infants and children tolerate sulphapyridine well, and vomiting as a result of administration of the drug is rarely a factor of any importance. Vomiting is usually a manifestation of the disease, and in its most troublesome form it is practically limited to the patients suffering from severe toxæmia. Restriction of fluid intake by mouth, the rectal administration of fluid, and perhaps several intramuscular injections of sulphapyridine, are the first measures to be given a trial in the less severe types. The more severe types, or the milder types in which improvement fails to occur, demand complete cessation of the giving of both fluids and the drug by mouth, and the administration of both by the continuous intravenous method. It is emphasized that it is not often necessary to adopt these measures.

Restlessness, irritability and delirium are not infrequently encountered. The majority of patients with these symptoms respond very well to adequate nursing measures and to the administration of a sedative, such as a mixture of chloral hydrate and sodium bromide. The few who have these symptoms in a more severe form require either paraldehyde or occasionally morphine. These phenomena are but rarely toxic effects of the administration of sulphapyridine and usually clear up as therapy becomes operative. If they persist after thirty-six to forty-eight hours of sulphonamide therapy, it is wise to consider other causes, such as toxic effects of sulphapyridine, inadequate fluid intake or increased intracranial tension, and corresponding measures may then be adopted.

Convulsions or twitchings are dealt with in a routine manner, first by the use of a mustard bath and a sedative mixture of chloral hydrate and sodium bromide. If these steps are unsuccessful, paraldehyde is administered *per rectum*, or if there is evidence that increased intracranial tension is a factor of importance, lumbar puncture is performed. These measures have been successful for the patients who have had convulsions.

Retention of urine has not been encountered in any case in this series.

Sulphapyridine Concentrations in the Cerebro-Spinal Fluid.

The sulphapyridine concentration in the cerebro-spinal fluid of sixteen patients has been investigated at different intervals of time after the administration of the drug, the doses being those recommended in Table III. Sixteen children, aged between seven weeks and thirteen years, had the sulphapyridine concentration of the cerebro-spinal fluid estimated after twenty-four hours of treatment. Three of the sixteen patients had total sulphapyridine concentrations of between 10 and 20 milligrammes per 100 cubic centimetres of cerebro-spinal fluid, six had values between 5 and 10 milligrammes per 100 cubic centimetres, and seven had values between 1·9 and 5 milligrammes per 100 cubic centimetres. Estimations were carried out again between the second and fifth days; of the maximum values recorded, one was 11·4 milligrammes per 100 cubic centimetres of cerebro-spinal fluid, and of the remainder eight were between 5 and 10 milligrammes, and seven were between 1·9 and 5 milligrammes per 100 cubic centimetres (see Table IV). The method used to determine the concentration of sulphapyridine was the colorimetric method described by Werner in 1939.[3] The drug was administered by mouth to each of the patients.

TABLE IV.

Maximum Sulphapyridine Concentrations in the Cerebro-spinal Fluid of 16 Patients Suffering from Meningococcal Meningitis Twenty-four Hours after the Commencement of Treatment, and on the Second to Fifth Days of Treatment.

Free Sulphapyridine in the Cerebro-spinal Fluid. (Milligrammes.)	Number of Patients.	
	After Twenty-four Hours' Sulphapyridine Administration.	After Five Days' Sulphapyridine Administration.
10·0 to 20·0	3	1
5·0 to 10·0	6	8
1·9 to 5·0	7	7
Totals	16	16

The following conclusions are reached from a consideration of the results of these estimations. Firstly, the free sulphapyridine concentration in the cerebro-spinal fluid in meningococcal meningitis varies considerably in children of the same age and size who have been given the same quantity of the drug by mouth. Secondly, a good clinical response and a rapid resolution of the meningitis occur apparently irrespective of the sulphapyridine concentration in the cerebro-spinal fluid. Four children responded well to treatment with maximum concentrations of sulphapyridine as low as 1·9, 1·9, 2·2 and 2·9 milligrammes per 100 cubic centimetres of cerebro-spinal fluid respectively.

Thirdly, estimations of sulphapyridine concentration in the cerebro-spinal fluid are of comparatively little clinical value, provided that the dosage as judged by experience is adequate and the patient is not vomiting. Sulphapyridine estimations should be reserved for those patients whose clinical progress is not satisfactory.

Results of Treatment by Sulphapyridine.

The total mortality rate in the series of 117 patients was 10·2%; a detailed analysis of the mortality in the various age groups is presented in Table V. It is evident that the younger the patient the greater the mortality rate, babies aged under six months being more than three times as vulnerable as children aged over three years.

TABLE V.

Results of Treatment of 117 Children Suffering from Meningococcal Meningitis with Sulphapyridine from January, 1939, to August, 1942.

Age.	Number of Patients.	Number of Deaths.	Mortality Rate. (Percentage.)
Under six months	31	6	19·4
Six months to one year	10	1	10·0
One to three years	27	2	7·4
Three to fourteen years	49	3	6·1
Totals	117	12	42·9

An outstanding feature is the rapid clinical improvement of the majority of patients; children who are dangerously ill can usually sit up and play within four or five days, and are ready for discharge from hospital in two weeks. The average duration of stay in hospital for the 105 patients who recovered was only 18·2 days. No less dramatic is the rapidity of resolution of the meningeal inflammation; the cerebro-spinal fluid is rendered sterile within twelve to thirty-six hours, and in a period of ten or twelve days the cellular content is reduced from several thousand polymorphonuclear cells per cubic millimetre to a figure ranging from two to twenty lymphocytes per cubic millimetre. The cerebro-spinal fluid of only one patient yielded a culture of meningococci after two days' treatment, the culture in this instance being a very feeble one.

In many cases the temperature chart is a valuable clinical guide as to the patient's progress under treatment. The temperature, which is usually high (103° to 105° F.), falls steeply to normal during a period of two to four days and remains at a normal level (see Figure I). However, in the case of a number of less acutely ill young children and infants the temperature is very variable, both in the initial stages of the disease and during treatment. Temperature charts may therefore be misleading if used as the only guide to progress. The illness of some infants may run an almost completely afebrile course, or at the most the fever may be of low grade (see Figure II). The illness of other infants runs an irregular febrile course not related in any manner to the progress of the meningeal inflammation (see Figure III). A number of infants have an irregular pyrexia after eight to twelve days of treatment, despite the clinical appearance of well-being and a cerebro-spinal fluid characterized by no other abnormality than two to ten lymphocytes per cubic millimetre. It cannot be over-emphasized that examination of the cerebro-spinal fluid is the only means of assessing with certainty the resolution of the meningeal inflammation. Eight infants, all aged under one year, had a very delayed clearing of cells from the cerebro-spinal fluid as compared with other patients. The number of cells in the cerebro-spinal fluid fell after the first week of treatment to the region of 100 to 150 per cubic millimetre, of which 10% to 30% were polymorphonuclear cells, and not until a period of three or four weeks or even longer had elapsed did the cerebro-spinal fluid become free of cells (Figure IV). At no stage after the second day was a culture of meningococci obtainable from the cerebro-spinal fluid. These patients did not appear ill clinically, nor did they differ in any way in the manner in which they responded to sulphapyridine therapy. They had not been ill more than one to four days prior to treatment, and the dosage of sulphapyridine was similar to that administered to other infants. No explanation can be offered for this delayed resolution of the meningeal inflammation, and as far as can be determined it is of no significance from the point of view of prognosis.

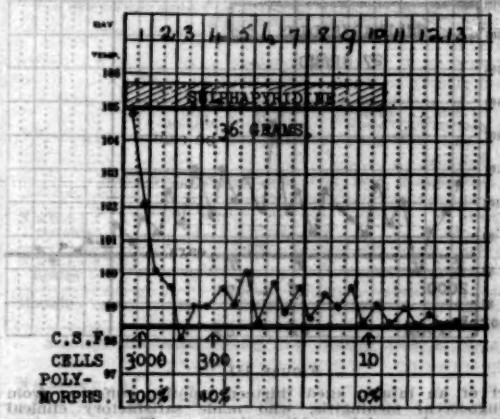

FIGURE I.

Chart showing typical response to sulphapyridine therapy of a child, aged seven years, acutely ill with meningococcal meningitis for two days. Note the rapid clearing of the cerebro-spinal fluid of cells.

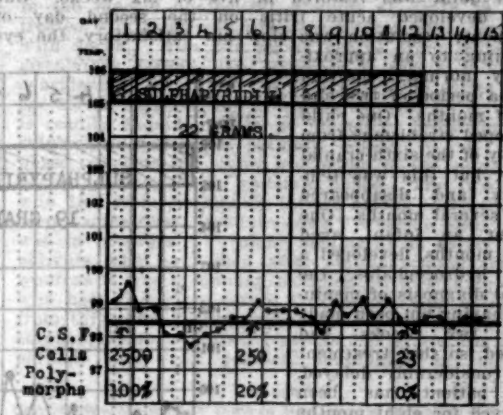

FIGURE II.

Chart of an infant, aged five months, who had been ill with meningococcal meningitis for three and a half days. Treatment with sulphapyridine was carried out and convalescence was uneventful. The findings in the cerebro-spinal fluid at various stages of the treatment are shown.

Complications.

Complications during treatment have been comparatively few, and not a single sequela has been observed. Complications are best classified as follows: (i) complications which are directly the result of the disease; (ii) complications which are attributable to the toxic effects of sulphapyridine; (iii) complications which may be associated with the meningitis, although not directly due to it. Complications directly due to the disease have been few, and not one patient has been left with a sequela. Two patients developed acute arthritis of the knee joint, one on the tenth day and the other on the sixteenth day after the commencement of treatment; in both cases sulphapyridine therapy was discontinued on the tenth day, the cerebro-

spinal fluid at this time being normal. Glairy, purulent fluid was aspirated from the knee joint of each patient, but attempted culture in neither case yielded a growth of organisms. In each case the swelling and pain subsided

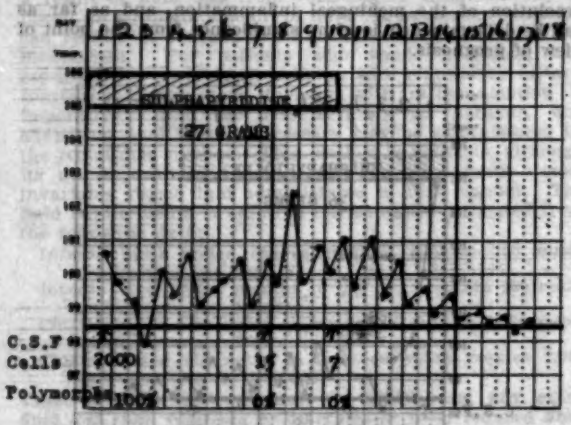

FIGURE III.

Chart of an infant, aged thirteen months, suffering from meningococcal meningitis, who made satisfactory clinical progress under sulphapyridine therapy. The temperature was "irregular". Note the complete lack of correlation between the temperature chart and the cerebro-spinal fluid findings.

rapidly with no other treatment than immobilisation of the limb in a plaster cast, and completely normal function of the joint was restored in five or six weeks. One child developed acute iritis on the second day of treatment; resolution was slow but satisfactory, the eye returning to an approximately normal condition after a period of two and a half months. One child developed strabismus from a palsy of the sixth cranial nerve, but this was temporary and disappeared after several months. One patient, an infant, aged three months, developed a mild hydrocephalus, the initial diagnosis of meningitis having not been made until two weeks had elapsed, so that treatment was considerably delayed. The patient has been observed for eight months and the hydrocephalus has completely disappeared. The mental development is as far as can be ascertained normal, and the infant has passed the normal milestones of development. Of the acutely ill patients, twelve developed circulatory failure and suffered from profuse vomiting of blood-stained fluid. Continuous gastric aspiration and continuous intravenous therapy with saline solution were successful in relieving six patients, but the remainder died.

Complications, the result of the toxic effects of sulphapyridine, have been relatively few, especially in view of the large doses employed. Three infants, all aged less than three months, developed moderately severe anæmia; in one case the hæmoglobin value was reduced to as low a level as 35% (13·8 grammes of hæmoglobin per 100 cubic centimetres of blood equals 100%), the number of red corpuscles to 1,850,000 per cubic millimetre, and the number of white blood corpuscles to 2,600 per cubic millimetre, 90% of the latter cells being lymphocytes. A transfusion of whole blood was administered, after which convalescence was entirely uneventful; the hæmoglobin value was raised to more than 100% and has been maintained at that level for a period of over four months, up till the present time. The other two infants responded well to iron therapy after sulphapyridine treatment had been discontinued. A number of children, and particularly infants, exhibit pallor after the illness and treatment with sulphapyridine; but contrary to expectation, the hæmoglobin value is rarely reduced by more than 5% to 10% of normal, and after cessation of treatment the patient's colour and hæmoglobin value are rapidly restored to normal.

Contrary to what is experienced in adults, vomiting is not troublesome and has been severe in only two cases; in each case it occurred on the second or third day of treatment and necessitated intravenous therapy. Restlessness and delirium have not been very troublesome features and have largely been attributable to the toxic nature of the illness and not to the toxic effect of sulphapyridine. It is curious that sulphapyridine appears to have but little toxic effect on a patient who is very ill, yet one with a mild illness may suffer severely from this drug. Two patients developed jaundice, associated with dark urine and pale stools, on the third day after cessation of treatment. The liver was not enlarged in either instance. In each case the jaundice was mild and did not last for more than six to twelve days. No other cause for the jaundice was discovered, and no other abnormal physical signs were observed. It is problematic whether the jaundice was due to toxic hepatitis resulting from the administration of sulphapyridine or whether it was due to some other cause (for example, catarrhal jaundice).

Three patients developed a cutaneous eruption, not unlike the rash of rubella, several days prior to cessation of

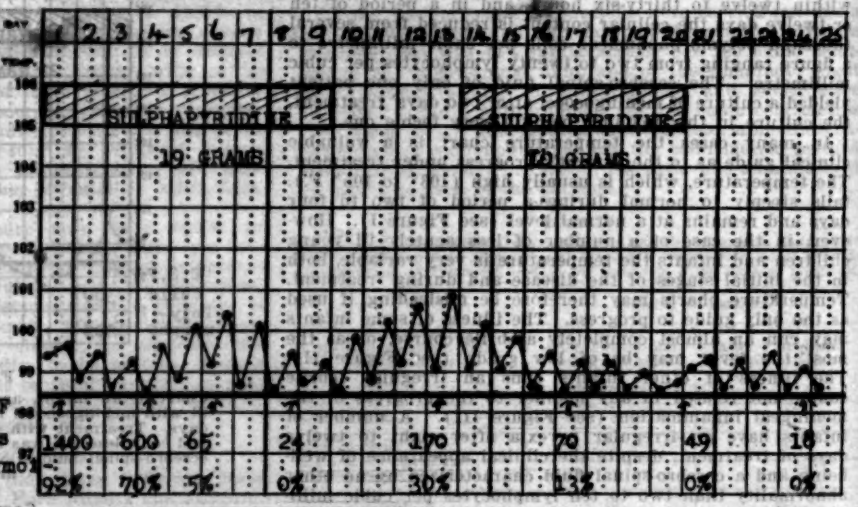

FIGURE IV.

Chart of an infant, aged one month, suffering from meningococcal meningitis, showing delayed resolution of the meningeal inflammation. The clinical course of the disease was uneventful. Probably the second course of sulphapyridine therapy was unnecessary. Note the delayed clearing of cells from the cerebro-spinal fluid.

sulphapyridine therapy; in each instance the rash promptly cleared after the administration of the drug was discontinued. Hæmaturia was not observed in any of the cases. Cyanosis was not infrequent, and was not related to the dose of sulphapyridine administered. Apparently it was of little clinical significance.

Complications from associated illness have been the result mainly of respiratory tract and throat infections.

Two patients contracted tonsillitis, three nasopharyngitis and one a right basal pneumonia; all made uneventful recoveries. During a period of three or four months when the epidemic of 1942 was at its height, labial herpes was commonly observed, and in several of the younger patients a severe herpetic stomatitis occurred.

Prognosis.

Several factors are of importance in prognosis, the most significant being (i) the age of the patient, (ii) the duration of symptoms prior to treatment, (iii) the severity of the infection and (iv) the efficacy of sulphonamide therapy.

The younger the patient, the greater the mortality rate; for infants aged under six months it is 19·4%, whilst for children aged over three years it is 6·1%. For infants aged between six months and three years the mortality rate is intermediate between these two figures. The relationship of age to mortality rate is shown in Table II.

The length of time for which the meningitis has been present prior to treatment is a most important prognostic factor. Patients in whom the meningitis has been in progress for over one week run a considerable risk, owing to the likelihood of the development of acute hydrocephalus resulting from adhesions and exudate causing an acute obstruction in the free circulation of the cerebro-spinal fluid. No less than five out of seven patients died, who were not treated until after eight days had elapsed since the onset of the disease, and of the two who recovered, one developed temporary mild hydrocephalus. In contradistinction, in a group of 28 patients, in whom the meningitis had been in progress for three to seven days before treatment was commenced, not a single death or sequela occurred. This is probably attributable to the relative mildness of the illness and to the fact that treatment was instituted before any exudate could organize and form adhesions. The remainder of the deaths occurred among patients who had been ill for a period of from one to three days. The commonest cause of death in this group of patients was circulatory failure, the result of severe toxæmia. Patients of this type almost without exception contract the illness in epidemic periods. Twelve dangerously ill patients with evidence of circulatory failure have been observed, and of these six have died. The clinical and pathological evidence strongly suggests that death is the result of severe toxæmia and that the meningitis is only one aspect of the disease process. Toxæmia of sufficient severity to cause circulatory failure in a healthy child is to be interpreted as an extremely dangerous illness and of serious prognostic importance. Steadily progressive circulatory failure is in my experience without exception fatal.

For the more severely ill patients, it is imperative to institute quickly the measures outlined in the section on treatment. Delay in the administration of adequate sulphapyridine by mouth or intravenously if necessary, and neglect in maintaining an adequate fluid balance, may easily mean the difference between success or failure. For patients who are less severely ill, the same urgency does not exist.

Discussion.

The vast improvement in the treatment of patients with meningococcal meningitis by sulphonamides[4] can be thoroughly appreciated only by comparison with the results obtained by the use of serum therapy. In a series of 74 patients treated with serum at the Children's Hospital, Melbourne, from July, 1926, to July, 1938, 37 died, a mortality rate of 50% over all ages. The mortality rate for infants aged under six months was 88·8%; the prognosis for children aged over one year was better, the mortality rate being 30% for children aged from one to three years, and 36·8% for children between the ages of three and fourteen years. Of these 74 patients, all but twelve became ill during a period when the disease was endemic; these twelve patients came from a children's home at Broadmeadows, where a local epidemic occurred during the period from 1937 to 1939.[5] Seven of these twelve patients died, and five recovered. The serum administered was from 1935 to 1938 a mixture of polyvalent antibacterial and antitoxic meningococcal serum, and from 1926 to 1935 polyvalent antibacterial serum. The serum was administered intravenously, intramuscularly and intrathecally to the majority of the patients, and to a few patients into the ventricles. Table VI gives a comparison of the mortality rates under the various age groups of 117 patients treated with sulphapyridine and 74 patients treated with serum.

TABLE VI.

A Comparison between the Mortality Rates of Children Suffering from Meningococcal Meningitis.

	Age.				Totals.
	Under Six Months.	Six Months to One Year.	One to Three Years.	Three to Fourteen Years.	
Serum-treated Patients from July, 1926, to July, 1938.					
Number of patients ..	18	14	23	19	74
Number of deaths ..	16	7	7	7	37
Mortality rate..	88%	50%	30%	36·8%	50%
Sulphapyridine-treated Patients from January, 1939, to August, 1942.					
Number of patients ..	31	10	27	49	117
Number of deaths ..	6	1	2	3	12
Mortality rate	19·4%	10·0%	7·4%	6·1%	10·2%

No less striking than the greatly reduced mortality rate associated with sulphonamide therapy, are the alterations in the morbid anatomical findings at death in subjects treated with sulphapyridine as compared with those treated with serum. The number of deaths from toxæmia and circulatory failure, the result of a severe infection, is considerably higher in the sulphapyridine series than in the serum series—5·1% as compared with 2·7%; this fact is readily understandable, as the major proportion of the sulphapyridine-treated patients belong to an epidemic phase, whereas the major proportion of the serum-treated patients belong to an endemic phase. The two patients who died from circulatory failure among those treated by serum came from Broadmeadows,[5] where a local epidemic was in progress. Purulent meningitis is rarely seen in patients who have died after sulphapyridine treatment, whereas it was a common pathological finding in patients who had died after serum treatment. One patient died from this cause in the series of 117 patients treated with sulphapyridine, a mortality rate of 0·86%, whereas eighteen patients died from purulent meningitis in the serum-

TABLE VII.

Comparison of the Causes of Death in Meningococcal Meningitis of 117 Children and Infants Treated with Sulphapyridine from January, 1939, to August, 1942, and of 74 Infants and Children Treated with Serum from July, 1926, to July, 1938.

Cause of Death.	Serum Treatment. (74 Patients.)		Sulphapyridine Treatment. (117 Patients.)	
	Number of Deaths.	Mortality. (Percentage.)	Number of Deaths.	Mortality. (Percentage.)
Septicæmia, meningitis and circulatory failure ..	2	2·7	6	5·1
Purulent meningitis ..	18	24·3	1	0·86
Post-basic meningitis—				
(i) Hydrocephalus ..	13	21·6	3	3·4
(ii) Pyocephalus	3		1	
Complications	1	1·3	1	0·86
Totals	37	50·0	12	10·2

treated group, a mortality rate of 24·3%. Death from post-basic meningitis and hydrocephalus or pyocephalus was relatively common in the serum-treated group of patients, being 21·6% as against 3·4% in the sulphapyridine-treated series (see Table VII).

The considerable difference in mortality rate from purulent meningitis and post-basic meningitis among the serum-treated and sulphapyridine-treated patients is due presumably to the rapid destruction of the meningococcus in the latter group; the inflammatory lesion and exudate consequently undergo rapid and usually complete resolution.

Sequelæ from meningococcal meningitis when serum therapy alone was used were always to be feared, especially if the course of the disease was prolonged. Of the 37 patients who recovered among the 74 serum-treated patients, 33 have been traced and followed up carefully for a number of years. Six of these 33 patients have been afflicted with permanent handicaps; two are epileptics and mental defectives, two have hydrocephalus (one with generalized spasticity and mental deficiency, the other with a milder grade of hydrocephalus and some mental retardation). Of the remaining two patients, one is a mentally defective deaf mute, and the other has some mental retardation and a mild hemiparesis. Thus, of these six patients, four are badly mentally defective and socially and economically useless. Of the remaining two, one is left with a physical defect, and the other is mentally subnormal.

In contrast to these terrible sequelæ, not one patient of 105 who recovered after sulphapyridine treatment has been permanently handicapped. These striking differences can be attributed only to a rapid resolution of the meningeal inflammation, with reduction to a minimum of scarring and its attendant risks.

The average period of time spent in hospital by each patient who recovered after serum therapy was 42·7 days, whilst the average time for each patient treated with sulphapyridine was reduced to 18·2 days. This greatly reduced length of stay in hospital is further proof of the rapidity with which the inflammatory lesions resolve.

The value of serum therapy in conjunction with sulphonamides when compared with sulphonamide treatment alone is difficult to determine with any degree of certainty. My experience has been limited to its use in eighteen cases, in four of which death occurred, a mortality rate of 22·2%. These figures may not be used for comparison, as all patients who died were babies aged under six months, and three of them had been ill for ten days prior to the institution of treatment. All died as a result of internal hydrocephalus from post-basic meningitis, basal meningeal adhesions being found in two patients, and adhesions with very slight fibrino-purulent exudate in the other two. Of the remaining fourteen patients who recovered, one was left with gross hydrocephalus and severe mental retardation. This series of patients is too small and is comprised of non-comparable patients; hence no conclusion is drawn as to the value of combined serum and sulphonamide therapy.

Antibacterial serum is comparatively slow in rendering the cerebro-spinal fluid sterile; on *a priori* grounds therefore it can have little or no additional value if used in conjunction with the sulphonamides. This view is further supported by the fact that purulent meningitis is rarely a cause of death of patients adequately treated with one of the sulphonamides; it has happened only once in 117 cases in my experience. The two main causes of death are, firstly, profound toxæmia in the case of acutely ill patients, and secondly, adhesions from post-basic meningitis. In the second group obviously serum can be of no possible value, and in the former an antibacterial serum acts too slowly. As the cause of death is primarily severe toxæmia, it is reasonable to try the intravenous administration of large doses of antitoxic serum. It is therefore evident that reduction of the mortality rate depends on two factors. The first is earlier recognition of the disease in infants, for the death of these patients is due to acute hydrocephalus, the result of delayed resolution with organization of exudate around the base of the brain. The only measure to hasten resolution is earlier diagnosis and treatment. The peculiar features of the disease in infancy have been stressed, and prognosis and mortality rate have been shown to be closely related to the length of time during which the disease has been in progress prior to the institution of treatment. The second factor is that circulatory failure from toxæmia is an important cause of death, and apart from the intravenous administration of saline solution and sulphonamide therapy no measures seem to be of any value. Antitoxic serum given intravenously in large doses would be well worth a therapeutic trial for any patient with severe toxæmia who has evidence of circulatory embarrassment.

Summary.

1. A series of 117 infants and children suffering from meningococcal meningitis has been treated by sulphapyridine; twelve of them died, a mortality rate of 10·2%.

2. The two main causes of death in meningococcal meningitis are, firstly, septicæmia and meningitis with circulatory failure, and secondly, post-basic meningitis with hydrocephalus. In the former group the patient is rapidly overwhelmed by a very severe infection, and in the latter group death is attributable to adhesions forming in the basal regions of the brain owing to delayed treatment, with resulting acute internal hydrocephalus.

3. The mortality rate is definitely related to the age of the patient; among infants aged under six months it is 19·4%, whilst among children aged over three years and under fourteen years it is 6·1%.

4. The clinical features of meningococcal meningitis in both infants and children are discussed and relevant points in the diagnosis are emphasized.

5. The dosage of sulphapyridine and methods of administration in treatment are discussed.

6. The importance of maintaining an adequate fluid balance in these patients is emphasized, and the methods of achieving this object are demonstrated.

7. Sulphapyridine concentrations in the cerebro-spinal fluid following the oral administration of the drug are shown to be variable and of little clinical significance, provided the dose of the drug is adequate.

8. Complications of the disease are relatively few and sequelæ have not occurred in this series.

9. Various factors in prognosis are discussed.

10. The results of treatment of 117 patients with sulphapyridine are compared with those obtained by serum therapy in a series of 74 patients from 1926 to 1938; the mortality rate was 50% in the latter as against 10·2% in the former, and complications and sequelæ were common with serum therapy. Hydrocephalus and fibrino-purulent meningitis were common causes of death of serum-treated patients; but when sulphapyridine treatment is used these causes, especially the latter, are infrequent.

11. The reduction in mortality rate with sulphapyridine therapy can come only from earlier diagnosis and treatment, so that post-basic adhesions are prevented from developing, and from measures to prevent circulatory failure and collapse. Anti-meningococcal serum in large quantities given intravenously would be worth a trial in the latter group of patients.

Acknowledgements.

I am indebted to my wife and to Dr. Reginald Webster for help and criticism in the preparation of the manuscript. The major portion of the patients have been under the nursing care of Miss K. Wilson, and a considerable amount of the credit for the good results of treatment are due to her skill and thoroughness.

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THE STATE, MEDICINE AND THE INDIVIDUAL.

Society is made up of individuals, men and women who think, feel, suffer and rejoice, each in his or her own peculiar way; each is cast in a different mould, endowed at least potentially with the virtues and vices of his ancestors and susceptible to the blessings and bludgeonings of circumstance. As a member of a family or herd an individual to a large extent sinks his individuality; were each to insist on going his own way, taking no thought of anyone else, there would be neither herd nor family. Communal action taken to control society or State is action of a group of individuals; it ceases to be individual action. Alexis Carrel puts this in an interesting way when he states that modern society ignores the individual and takes account only of human beings.[1] He explains that human beings are not found anywhere in Nature, that there are only individuals. "The individual differs from the human being because he is a concrete event. He is the one who acts, loves, suffers, fights, and dies. On the contrary, the human being is a Platonic Idea living in our minds, and in our books. He consists of the abstractions studied by physiologists, psychologists, and sociologists." Although the action of a State is the action of a group of individuals, it is clear that this action may be directed either to what is regarded as the good of the individual as such or through the individual to the aggrandisement of the State. An example of the latter type of direction was quoted in these pages a week or two ago in a discussion on preventive medicine in Chile. It was shown that the general health policy of that country is directed primarily to "the protection of human capital". Special action is taken in regard to diseases which are economically worth curing and in regard to which effective treatment is possible. Chile also has a system of "preventive rest" as an essential and effective means of saving the sick worker, of treating him rapidly and of prolonging his working life. This rest, however, is granted only to those likely to improve in health or recover. This is a cold-blooded and soulless attitude which is unworthy of a democratic community.

Medicine is concerned directly and indirectly almost solely with the individual, with his mental and bodily well-being. Very few of the measures undertaken by the State for the amelioration of the conditions in which man lives and moves and has his being are outside the sphere of medicine. Even medical practitioners do not always realize that there is no border line between preventive and curative medicine, that one who is engaged in the latter must of necessity make frequent adventures into the realms of the former. Professor John A. Ryle has emphasized this point in telling fashion in a recent lecture on the progress and present aspects of medical science. Part of this lecture has been published[1] under the title "Ætiology: A Plea for Wider Concepts and New Study". Ryle states that the discovery by Pasteur and the great pioneers in bacteriology of specific microbic agents of disease, and the recognition by others of specific chemical agents and specific deficiencies have, until quite recently, and contemporaneously with their immense benefits to medicine, had a peculiarly limiting effect upon the vision and practice of many medical men, not excluding teachers. There has been a neglect of the associated causal factors without which no disease can have its being and a belief in or a search for single determining causes has been fostered, where none exist. Ryle shows that "of all the functions of ætiological science in its broader practical applications the most important are the recognition and more intimate study of those factors in their work, nutrition and housing, which at present take such a heavy toll of the life, health and efficiency of the working classes in all countries". In other words ætiology extends beyond the province of pathology and invades the territory of social science. Thus we see that on the one hand medicine is very much a matter of the individual—as Carrel puts it in his inimitable way, disease is a personal event, it consists of the individual himself, and there are as many different diseases as patients. On the other hand medicine has also to deal with the family or herd; it has to see that environmental conditions are not unfavourable to health and general well-being.

Unfortunately in its treatment of a sick or disabled man medicine cannot always regard him as a person whose individual rights are paramount—it cannot always look on disease as a "personal event". War brings many changes and one of them is the change in the attitude of the medical officer of the armed forces to those under his care. In wartime the medical officer, let us say of the army, must of grim necessity look on the men of his unit as cogs in the wheel that goes to make the whole war machine—they are cogs first and individuals second. In the practice of peaceful days, or of what passed as peaceful days, grave exception had to be taken to such an attitude, an attitude adopted as we have seen in Chile. In a war of survival there is no option. Apart from the outlook on disease, we have in the furtherance of our war effort to inaugurate and submit to forms of compulsion which are foreign to the type of life that we believe to be our heritage and more suited to standards adopted by the enemy. We know, of course, that we accept the compulsion willingly and that this makes all the difference.

[1] Alexis Carrel: "Man the Unknown", Chapter VII.

[1] *The Lancet*, July 11, 1942.

What has to be remembered is that much of this compulsion should only be temporary, an expedient adopted, like the army doctor's expedient, of grim necessity. In all their present activities, in all their planning for the future, whether such planning has to do with the general reconstruction of society or with the future practice of medicine which is after all but part of the general reconstruction, medical practitioners must keep before them a vision of the individual as the responsible and sentient unit of society. This is medicine's peculiar role. But apart from medicine the individual must be considered in every possible way. In the future he must be unshackled both in mind and in body—in his aspirations and strivings, as well as in his comings and goings—but with one proviso. The place in modern life of what we have called the family or herd is very real. In the years to come it is destined to increase in importance. The freedom of the individual from shackles must not be of such a degree that it will prevent him from taking his full share in the life of the herd. The man with understanding will be prepared to sink his own individuality to that extent, knowing that his greatest freedom and satisfaction will arise in the service of his fellow man. Compulsion will have to be applied to those not possessed of such understanding and willingness to cooperate. The result will depend on the intelligence and impartiality of those who accept the task of leadership, who are given the authority to use compulsion. But that opens up a vast subject which must be left for a future occasion.

Current Comment.

EXCRETION OF FAT FROM THE BOWEL.

THE fat of the fæces is generally regarded as the remnants of fat from the food; that is, the fat that has not been absorbed. The presence of excessive amounts of fat in the fæces must then indicate an error either of digestion or of absorption. Pancreatic disease, obstructive jaundice, sprue, and hasty passage of the intestinal contents, are disorders that are immediately suggested. But within recent years some doubts have been expressed concerning the long-accepted explanation of the source of fæcal fat. Calixto Jose Nuñez and J. Arnold Bargen draw attention to experiments by various observers carried out on animals and man and they record the results of their own experiments on the human subject.[1] They point out that in 1924, Sperry and Bloor showed that fat was present in the fæces of cats and dogs fed on a fat-free diet. Sperry and Angevine expressed the opinion that desquamated intestinal epithelium was not an important source of fat in the fæces, and they demonstrated that when a dog with an ileal fistula was given a fat-free diet, the amount of fat excreted by the fistula was greater than the amount excreted in the fæces of a dog without such a fistula. This statement is made without further comment by Nuñez and Bargen; it is difficult to see how it strengthens their argument; possibly it is incorrect. Other investigators found that the amount of cholesterol in the intestinal contents was greater in the colon than in the ileum of dogs and cadavers. In 1934 Krakower expressed the opinion that when fat was given in moderate amounts in the food, the fat in the fæces did not represent the residue from the food, but probably was the result of excretion of fat from the blood into the intestinal tract. Doubilet and Reiner, as a result of studying a patient with an ileal fistula, concluded that the ileum secreted a fluid that contained 2% of fat.

[1] *Annals of Internal Medicine*, July, 1942.

Nuñez and Bargen studied fourteen subjects, of whom two were normal, nine had ulcerative colitis, one had undergone ileostomy and resection of the right half of the colon and the terminal part of the ileum, and two had had ileocolostomy performed (one having been subjected to resection of the right half of the colon as well). They gave a "fat-free" diet to ten of these patients over a known period, and they gave a diet very rich in fat to the remaining four, who were suffering from ulcerative colitis.

Their so-called "fat-free" diet consisted of "vegetables and fruits, sugar, jelly and candy". It had a caloric value of about 2,000 in the twenty-four hours, and contained approximately 1·65 grammes of fat. In every instance in which the "fat-free" diet was given the amount of fat excreted in the fæces was greater than the amount in the food. The amount of fat excreted by the two normal subjects was greater than the amount excreted by any of the others excepting those who were given food rich in fat. "Furthermore, excretion of fat by persons who had thrombo-ulcerative colitis . . . was greater than excretion of fat by patients who had been subjected to resection of the right half of the colon." This latter statement is not confirmed by an examination of the figures tabulated by Nuñez and Bargen. These show that while the percentage of fat in the stools was higher in the patients with colitis than in the patients who had been subjected to colectomy, the actual quantity of fat excreted during the course of the experiment was no greater. This is of some importance, as Nuñez and Bargen use what seems to be an inaccurate finding in drawing their conclusions. They remark: "These facts would suggest that the large intestine itself plays a part in the excretion of fat and that the greatest excretion occurs in the proximal segments of the large intestine." The latter of these two inferences scarcely seems justified. As to the other inference, reasonable doubt may be felt. The patient who had been subjected to ileostomy excreted more fat (but not a higher percentage) than the patients with colitis. Certainly the normal persons excreted more fat than those affected with colitis; but the difference was not necessarily due merely to damage to the colon. A person with ulcerative colitis is ill; no doubt many of his physiological activities are depressed.

The one thing that is clear from these experiments is that the intestine secretes or excretes fat into its lumen. A knowledge of the function of the colon as an excretory organ, and the results of investigations by various observers, would lead one to think that the colon would be the part of the intestine in which the secretion of fat would be greatest. The matter is of more than academic interest. We should like to see the results of experiments on a very much larger group of normal persons, as well as a further investigation of the relative amounts of fat in the excretion from the ileum and the excretion from the colon. Various intestinal abnormalities, including constipation and the so-called "mucous colitis", might be investigated with profit.

PNEUMONIA IN INFANTS, CHILDREN AND ADULTS.

FOR at least thirty centuries pneumonia has been a leading cause of death. No satisfactory methods of prevention have ever been proposed, and until the last few years no known treatment influenced the death rate in pneumonia or the course of the disease. The recognition by Fränkel and Weichselbaum in 1884-1886 of the pneumococcus as the usual cause of pneumonia was followed about twenty-five years later by the separation of the organism into a number of types. This led to a good deal of work on the antigenic properties of the constituents of the bacterial cell; and later, serum possessing antibodies specific to certain individual types was prepared. The administration of this serum provided the first consistently decisive therapeutic results ever obtained in the treatment of pneumonia. Serum treatment attained a fair degree of efficiency, but it had at least two grave drawbacks; firstly, there was often delay and sometimes considerable

uncertainty in deciding on the type of pneumococcus responsible for the pneumonia and therefore delay or waste in the administration of the appropriate serum, and secondly, the serum treatment of pneumonia was very expensive. Mortality and morbidity rates in this disease were not much improved, except perhaps in some large North American clinics. The real solution of the problem came suddenly, dramatically, unexpectedly from another quarter altogether. There have been few more thrilling episodes in the history of medicine than the discovery of the sulphonamide group of drugs. The use of sulphapyridine and later sulphathiazole and sulphadiazine have revolutionized the treatment of pneumonia. Before the discovery of these drugs the case fatality rate was said to be 20% to 25% in England and 30% to 32% in North America; with specific chemotherapy it has fallen to 9% or 10%.

What then is the present value of serum treatment, and of the laborious work involved in the systematic typing of pneumococci isolated from sputum or blood in pneumonia? G. Ormiston, D. Woodman and F. J. W. Lewis[1] believe that it is still useful and should be continued. They admit that the relative simplicity of drug treatment is without question. But some cases of pneumococcal pneumonia fail to react to sulphapyridine, just as some failed to react to the appropriate serum. Ormiston and his associates feel that studies of the pneumococcus should continue; pneumonia is not yet vanquished; the heel must be kept firmly on the neck of the dragon and no weapon should be cast aside until victory is complete. They deplore the fact that "under present conditions serum treatment is likely to be neglected or left to a few enthusiasts, so that little fresh information may be forthcoming about the natural history of pneumococcal pneumonia". They present a study of a series of cases drawn from 191 infants, children and adults admitted to hospital from December, 1940, to the end of July, 1941, with a provisional diagnosis of pneumonia. In 49 of these the diagnosis was not substantiated; the remainder were placed in the following categories: (*a*) primary pneumonia, 110 cases; (*b*) pneumonia secondary to measles or pertussis, 29 cases; (*c*) other secondary pneumonias, three cases. Of the primary pneumonias, 66 were lobar and 44 bronchopneumonia. The first section of this study deals with primary pneumonia affecting 41 infants and 25 children, 66 cases in all. An attempt was made to determine the causal organism in each case from one or more laryngeal swabs. Seventeen (41%) of the 42 types isolated belonged to type I, II or III. This finding, somewhat unusual in children, was thought to be due to their having led a "shelter existence" during air raids, in close contact with adults. The response to treatment with sulphapyridine was satisfactory in 34 of 52 cases. Forty-four cases of primary pneumonia amongst adults were investigated; 39% of the recognizable pneumococci isolated belonged to type I, II or III. In six cases the course of the disease was unaffected by sulphapyridine; the pneumococcal types in this group were similar to those found in the group of cases in which the response was satisfactory. No clear relationship between the type of pneumococcus and the response to chemotherapy was demonstrated. The authors state that "further inquiry should be made into the response connected with individual types of pneumococcal pneumonia, so that in time chemotherapy may become still more effective and economical in use". But their findings provide little if any grounds for this statement, and it is difficult to see how further inquiry is likely to "make chemotherapy more effective and economical". Consider the elaborate technique of typing the pneumococcus used by Ormiston and his co-workers:

> A saline emulsion of the sputum was inoculated intraperitoneally into a mouse. Swabs were stirred in approximately 1 c.c. of nutrient broth. A direct film was made from this mixture and stained by Gram's method. The swab was then plated on a fresh blood plate and ½ to 1 c.c. of the impregnated nutrient broth inoculated intraperitoneally into a white mouse. Before inoculation the broth was incubated for two hours, save in a few cases where the swab was received fresh. The fresh blood plate was examined after 24 hours' incubation and the predominant organisms identified by further tests if necessary. The mice were killed after 48 hours, unless definitely ill, when they were killed after 18 to 24 hours. Typing was done by the Neufeld method on the peritoneal fluid of the killed mouse. The peritoneal fluids were stained by Gram's method and plated on to fresh blood. Pneumococci which were not recovered from mouse inoculation, but grew on culture on blood-agar, were emulsified in saline, inoculated into a second white mouse and typed from this.

Cooper's 32 types were used. The question arises, whether a pneumococcus isolated from a laryngeal swab, or even from sputum, is necessarily the causal organism. Not rarely two or more types of pneumococcus may be isolated from one specimen or from the same patient on successive days. The problem is by no means simple. D. C. Stahle[2] made a clinical analysis of 15,000 cases of pneumonia occurring in Pennsylvania between July 1, 1939, and April 1, 1941; in 6,043 the type of pneumococcus was ascertained. While certain types, for instance, type III, seemed to be associated with a higher case fatality rate, the type of the pneumococcus alone was not the factor responsible for the higher rate. In Stahle's opinion, there is no type of pneumonia for which serum should be given as a routine in addition to a sulphonamide. The case fatality rate was actually higher, in his series, in the group treated with sulphonamides and serum than among those given chemotherapy alone. This has been the experience of others, notably of M. Finland, W. C. Spring and F. C. Lowell,[3] who published an analysis of the results of serum therapy and chemotherapy at the Boston City Hospital in 1938-1939. Of course, patients given combined therapy were undoubtedly more severely ill. Stahle's opinion, given with reservations and apparently with hesitation, is that: "For those patients extremely ill, and in whom prompt recovery is necessary, early combined therapy is probably indicated." Serum may also be given if an early response to chemotherapy is not manifest. It is a tremendous task to manufacture even half of the types of specific serum required by the existence of at least 32 types of pneumococcus. Types I, II and III are most prevalent, but account usually for only one-third of cases. It is only when ample supplies of therapeutic serum are available that the typing of pneumococci from cases of pneumonia can be of use, and therapeutic serum is necessary only in exceptional cases. It is, however, in the domain of the exceptional case that the battle now rages; first-class clinical schools will continue at least for the present to make complete bacteriological examinations of the sputum in pneumonia.

[1] *The Quarterly Journal of Medicine*, July, 1942.

"THE BRITISH TRADITION AND THE NEW OUTLOOK."

READERS of this journal have been repeatedly urged to study every aspect of the changing situation in regard to medical practice. This involves the reading of addresses delivered in this country and overseas. Attention is therefore directed to the address of Sir Beckwith Whitehouse, President of the British Medical Association, delivered at the annual general meeting in September of this year. The address is published in the *British Medical Journal* of September 26, 1942. There is no need to give an outline of this address, for every member of the association in Australia receives the *British Medical Journal* as well as THE MEDICAL JOURNAL OF AUSTRALIA. The leading article in this issue of the journal was written before Sir Beckwith Whitehouse's address arrived in Australia. In view of its theme of the individual as the responsible and sentient unit of society, emphasis must be laid on the concluding statement of Sir Beckwith Whitehouse—that "whatever 'new order' may arise in the conduct of medical practice, the future happiness of our people is intimately bound up with the maintenance of our British tradition in medicine that a patient is a patient and not an impersonal unit in a system".

[2] *The Journal of the American Medical Association*, February 7, 1942.

[3] *Annals of Internal Medicine*, Volume XIII, March, 1940, page 1567.

Abstracts from Medical Literature.

PÆDIATRICS.

Anæmia in Nephritis.

P. MACARTHUR (*Archives of Disease in Childhood*, March, 1942) has made a detailed study of the blood changes occurring in the nephritis of childhood. A survey of the literature shows that, whilst most workers agree that anæmia frequently occurs in nephritis, there is considerable difference of opinion regarding the type of nephritis in which anæmia is found and the character of the anæmia when it does occur. In the present investigation an attempt has been made to gather fresh information on these two points, and the author's conclusions are as follows. In œdematous patients blood obtained by puncture of the lobe of the ear is slightly diluted, but the errors arising in making blood counts from blood obtained by venepuncture are greater than those arising from skin puncture, and the latter method is therefore preferable. During the stage of increasing œdema and oliguria in nephrosis and during the stage of diminishing œdema and active diuresis in acute nephritis, the blood is concentrated. In neither of these types of nephritis is more than slight anæmia present. When certain acute infections occur in the course of nephrosis, rapid and severe anæmia results, and after effective treatment of the infection the blood quickly returns to normal. Anæmia is not characteristic of nephrosclerosis in the absence of hæmorrhage, and when this occurs there is evidence of active hæmopoiesis. In chronic hæmorrhagic nephritis severe orthochromic normocytic anæmia with a normal or slightly increased number of reticulocytes and mild leucocytosis is often present. The blood picture is not that of an aplastic anæmia. No treatment that will influence the condition is known. It is only in this type of nephritis that true anæmia has been found.

Tests with Phenothiazine in the Treatment of Pinworm Infections.

MAX J. MILLER AND DELLA ALLEN (*The Canadian Medical Association Journal*, February, 1942) compare the use of phenothiazine with gentian violet in the treatment of pinworm infections. The phenothiazine was given in chocolate tablets—one gramme of phenothiazine and 4·5 grammes of chocolate proved the most popular combination. Twenty-five children, aged eight years, were each given the drug on three consecutive days in doses of 2·5, 2·5 and 2·0 grammes respectively—a total of seven grammes. Twenty-three children given the total dose were found to be completely free of infection upon post-treatment examination. Two children who received only 5·0 grammes of phenothiazine still gave evidence of infection. The results of the administration of gentian violet to children aged six to nine years showed the drug to be effective in 60% of cases. Of children receiving phenothiazine in the dosage of one gramme daily for six to eight days 64% were cleared of infection. However, post-treatment swabbings were probably taken too soon after completion of treatment. Phenothiazine reduced the hæmoglobin content of the blood—two grammes or more in one-third of the cases. There was a slight reduction in another third and none at all in the remaining third. The level returned to normal in twenty-one to twenty-eight days. The authors conclude that phenothiazine is probably more effective in the treatment of pinworms than gentian violet. Two cases, however, indicated possible toxic properties of the drug, which should be investigated before it can be freely recommended for anthelmintic use in children.

Sulphanilamide in the Treatment of Rheumatism in Children.

J. ZAHORSKY AND T. S. LABERSKY (*Archives of Pediatrics*, June, 1942) report the prompt and permanent relief produced by sulphonamide treatment followed by salicylate treatment in four cases of rheumatic fever in children. They point out that, although Swift, Morn and Hirst from their experience in a few cases of rheumatic fever advised against the therapeutic use of sulphanilamide in this disease, the authors' own trials have been encouraging. They believe that Swift obtained poor results because he did not begin treatment early enough. In all his cases the disease had existed for ten days or more. The authors believe that acute rheumatism in children should be recognized early and treated promptly. They hold that if rheumatic fever is due to a streptococcal infection, some favourable effect should be produced by sulphanilamide, not on the joints or nervous system, but on the original focus of infection (tonsil, mucous membrane or endocardium). The method of treatment adopted was to administer sulphanilamide or sulphathiazole in therapeutic doses for two or three days and then discontinue this drug and give salicylates only for several days.

Orthostatic Albuminuria from Nasal Sinusitis in Children.

W. RAY SHANNON (*Archives of Pediatrics*, July, 1942) discusses the association of nasal sinusitis and orthostatic albuminuria in childhood. By orthostatic albuminuria is meant a condition in which albumin appears in the urine when the subject is on his feet, but disappears when he is reclining. All other evidence of kidney disease, such as cellular elements, high blood pressure *et cetera*, are absent. These constitute the essential qualifications for diagnosis. Other points which have been sometimes stressed, such as lordosis, left kidney leak *et cetera*, are perhaps regarded as unessentials. The disease, if so it is to be called, is one of early life, tending to disappear as adult life is attained. Thus the prognosis has been considered as good. For many years the author has been aware of the fact that albuminuria, unaccompanied by other evidence of kidney disease, was a frequent finding in infection of the nasal sinuses in the patients coming to his consulting room. Although he had previously relegated several such patients to the benign class of "orthostatic albuminuria", it was not until September, 1941, that he became conscious of the fact that almost, and perhaps all, of these cases of albuminuria were of that type. Since then every case of albuminuria unaccompanied by other evidence of kidney disease has been investigated from that angle. So far, all urinary samples obtained after the patient had been in bed were free of albumin. The author's series consists of 16 patients varying in age from two and a half to seventeen years. In the group, a total of 68 examinations have been made of the urine obtained before the patients have arisen in the morning. Only once has albumin been found. This occurred in the case of a girl who was convalescent from scarlet fever, and in this instance no albumin was found in the evening sample. The possibility of confusion of the samples must be kept in mind, but at the same time it must be remembered that such an observation has been mentioned in orthostatic albuminuria. Later, this same patient showed the normal variation on many occasions and is one of the few still showing albumin in the daytime or evening samples. In two instances, not included among the 68, samples that were supposed to be morning specimens contained albumin. On being questioned, the patient admitted that he had forgotten to obtain the specimens until he had been out of bed in the first instance for fifteen minutes, and in the second for about one hour. The author states that it has been his purpose merely to record an observation and not to explain anything. He has no idea what is the significance of the phenomenon. Nor does he know whether other types of focal infections than nasal sinusitis are capable of causing the same urinary disturbance. It would seem highly probable that such might be the case, but his own experience does not furnish an answer. However, one thing does seem to stand out, namely, that at least in the cases he describes the cause of the orthostatic albuminuria is intimately associated with infection and is thus probably harmful in its ultimate effects. For this reason he is forced to disagree with the commonly held opinion that orthostatic albuminuria is a harmless phenomenon.

Pallor and Anæmia in Adolescents.

JOSEPH SCHWARTZMAN (*Archives of Pediatrics*, July, 1942) discusses the relation between pallor and anæmia in 943 cases. Among 106 patients with pallor, only 22 had true anæmia, while 84 had pseudo-anæmia. Eighty-four patients with true anæmia had no clinical pallor and their condition would not have been detected without the blood count. There was a total of 106 cases of anæmia for a percentage of 11·3. The male incidence was 2·1% and the females 20·7%. The hæmoglobin estimation corresponded to the anæmic status in 98·1%. In view of the above, routine hæmoglobin determinations should be made in all cases regardless of appearance. Any patient showing an abnormality should then have a complete blood count. With this economical and highly efficient screening method, many cases of undetected anæmia would be brought to light.

ORTHOPÆDIC SURGERY.

Ruptured Intervertebral Disks.

WALTER E. DANDY (*Annals of Surgery*, April, 1942) discusses recent advances in the diagnosis and treatment of ruptured intervertebral disks, and

points out that this condition, which twelve years ago was unknown, is now a clinical entity with precise definition, curable by operative means, surprisingly common, and responsible for a large proportion of cases labelled as sciatica, sacro-iliac arthritis, spondylitis *et cetera*. The diagnosis of ruptured intervertebral disk can be made simply and accurately from the symptoms alone, and the author considers that X-ray examination of the spinal theca after injection of contrast media should be entirely discarded as unnecessary and even dangerous. He claims to have had 63 cases without a single mistaken diagnosis, using clinical means only. The characteristic story is of low back pain spreading down the posterior aspects of one or both legs, and being intensified by coughing or sneezing. The pain usually follows a heavy lift or a twist of the spine. Movements of the spine intensify the pain. There may be a weakness or loss of the Achilles reflex on the affected side. Once a diagnosis has been made, localization can be based on statistical probability, since it is found that 96% of all ruptured disks and 98% of injured lumbar disks involve the fourth or fifth lumbar disk. A ruptured vertebral disk is one of the most satisfactory lesions to treat surgically, and the operation, as recently modified, need not involve the loss of bone, or at most, loss of only portion of one side of a lamina, while it is unnecessary to open the dura.

Injuries to the Astragalus.

R. D. SCHROCK, H. F. JOHNSON AND C. H. WATERS, JUNIOR (*The Journal of Bone and Joint Surgery*, July, 1942), have made a study of the results of fractures and fracture-dislocations of the astragalus. They present a brief historical review of the subject and several case reports. They point out that the blood supply to the astragalus is poor, and that it is interrupted by transcervical fractures of the bone. After injury to the astragalus revascularization takes place only slowly; hence the incidence of aseptic necrosis of varying severity, particularly noticeable in the body, is high. Early anatomical reduction of the fracture or fracture-dislocation is essential; it may be obtained by manipulation or by open reduction, with or without internal fixation, which will be determined by the stability of the fragments. The articular dome of the body must be smooth and the calcaneo-astragaloid surfaces must be accurately apposed. When subastragalar contact is faulty, immediate subastragalar arthrodesis is necessary to obtain earlier function and to prevent pain in the foot on weight bearing. When damage to these cartilage surfaces is obvious, tibio-astragalar arthrodesis must be employed. Rarely compound dislocations with minor fractures may occur; in such cases careful cleansing, painstaking *débridement* and the local and general administration of one of the sulphonamides provide a greater chance that conservative surgical measures will be successful. When the injury is a compound, badly comminuted fracture, a similar technique makes immediate reconstruction reasonably possible. In some instances, when the injury is a simple or compound but severely comminuted fracture, reduction of the fracture and retention of the fragments are impossible; astragalectomy or calcaneo-tibial arthrodesis is then necessary. The authors consider that according to the principles outlined in their paper, calcaneo-tibial arthrodesis appears to offer better results than astragalectomy.

The Overlapping Fifth Toe.

PAUL W. LAPIDUS (*The Journal of Bone and Joint Surgery*, July, 1942) discusses the overlapping fifth toe, and describes an operative procedure for its correction with which he has obtained satisfactory results over a period of some years. The condition is often congenital and sometimes it is also hereditary. The three main components of the deformity are as follows: (i) adduction contracture of the fifth toe towards the fourth; (ii) dorsiflexion contracture of the fifth toe at the metatarso-phalangeal joint; (iii) external rotation of the fifth toe around its long axis, so that its nail faces laterally. The author states that all the changes take place chiefly at the metatarso-phalangeal joint of the fifth toe, and that adduction may also be present at the proximal interphalangeal joint. The operative procedure used is carried out in the following manner. The distal stump of the *extensor longus* tendon, with its insertion intact, is run through an oblique spiral channel across the plantar surface of the toe, and implanted into the conjoined tendon of the abductor and short flexor of the fifth toe, after dorsal and medial capsulotomy of the metatarso-phalangeal joint has been performed. The author states that the operative procedure seems to be mechanically sound, because not only does it correct the main three components of the deformity, but also it utilizes the muscle power of the abductor and short flexor of the fifth toe for active maintenance of the correction.

Tuberculosis of the Vault of the Skull.

C. M. MENG AND Y. K. WU (*The Journal of Bone and Joint Surgery*, April, 1942) have studied forty cases of tuberculosis of the flat bones of the vault of the skull. They write from the department of surgery of the Peiping Union Medical College, China. In twenty of the forty cases the diagnosis was established histologically; in five cases it was established by animal inoculation or by cultural methods; in the remaining fifteen cases the clinical, radiological and other laboratory findings justified the diagnosis. Tuberculosis of the skull is not rare in places where tuberculosis is prevalent. It is an affection predominantly of childhood and adolescence. It is practically always secondary to active or latent tuberculosis elsewhere in the body. It is often associated with pulmonary lesions and lesions of bones and joints. Not infrequently tuberculosis of other flat bones may coexist in the same individual. The lesion is usually of the circumscribed type, often represented clinically by a painless cold abscess or discharging sinus. A correct diagnosis can usually be made if the condition is kept in mind, particularly if tuberculous lesions are found in other parts of the body. Occasionally difficulty is experienced in differentiating tuberculosis from other destructive lesions, especially syphilis. Radiological findings are helpful, but not always reliable; occasionally they may be misleading. A cure can reasonably be expected in selected cases if local excision is carried out. The authors have found, however, that in most cases the condition is so far advanced when the patient comes under observation that treatment must be confined to the application of dressings. The authors insist on the need for adequate general anti-tuberculosis care.

Excision of the Patella.

JOHN BRUCE AND ROBERT WALMSLEY (*The Journal of Bone and Joint Surgery*, April, 1942), writing from Edinburgh, discuss excision of the patella in the light of experimental and anatomical observations. They refer to the widespread vogue of patella excision in cases of fracture and to the use of the operation in other disabilities of the knee joint, because of its apparently innocuous nature. There is well authenticated evidence that removal of the patella does not greatly disturb the function of the knee joint. In Brooke's experience the very opposite obtains and the movement of the joint and the strength of the quadriceps are actually increased after the operation. The authors refer to the assertion of Brooke that the patella is not at all in anatomical connexion with the quadriceps, but is entirely separate from it, and lies actually behind the tendon in loose fatty tissue, the presence of which renders enucleation of the bone a procedure of great simplicity. This view has been supported by Hey Groves. The authors review the following fundamental points: (*a*) the exact relation of the quadriceps tendon to the patella; (*b*) the effects and sequelæ of removal of the patella; (*c*) the functional significance of the patella. They have examined these problems in the light of the development and adult anatomy of the bone and also by experimental means. Their experiments were carried out in rabbits and the various forms of operative techniques adopted were based upon the procedures used in clinical practice. They conclude that the patella develops as a part of the quadriceps apparatus. In the adult it retains a close association with the muscle and with certain of the muscle fibres; tendon fibres are directly attached to it. The patella has to be dissected from the muscle by sharp dissection which divides the muscular and tendinous insertions. The authors found that removal of the patella of the rabbit was followed by degenerative changes in the articular cartilage of the patellar surface of the femur, but not by any apparent change in gait or in joint efficiency. This suggests to them that the principal function of the patella is protective. Removal of the patella is followed by attempts at regeneration which sometimes result in the development of a bony structure of appreciable size. In other cases a fibro-cartilaginous change takes place in the quadriceps tendon at the former site of the patella. The authors hold that further investigation is necessary in the human subject in order to determine the extent of the degenerative changes; this should be done before the operation is practised widely for conditions other than fracture or serious organic diseases of the bone itself.

Medical Societies.

MELBOURNE PÆDIATRIC SOCIETY.

A MEETING of the Melbourne Paediatric Society was held on August 12, 1942, at the Children's Hospital, Melbourne, DR. H. L. STOKES, the President, in the chair.

Meningococcal Meningitis in Infancy and Childhood.

DR. HOWARD WILLIAMS read a paper entitled "Meningococcal Meningitis in Infancy and Childhood" (see page 535). Dr. Williams illustrated his remarks with a cinematograph film.

DR. REGINALD WEBSTER said that in his endeavour to supplement Dr. Williams's excellent review of meningococcus infections in childhood with some comments on those aspects of the disease which were the particular concern of the pathological department, he did not propose to expend any of the time at his disposal in description of the morbid anatomy of purulent meningitis. It would be more profitable, he thought, to consider the pathogenesis of meningococcus infection—a disease which might or might not express itself as cerebro-spinal meningitis. Referring to pathogenesis, Dr. Webster said that probably no Shakespearean passage had been more often quoted than that in which Juliet asked "What's in a name?", and though a little laxity in nomenclature might be allowed a heroine of romance, false and inadequate conceptions were likely to follow lack of precision in the denomination of disease processes. The disease under discussion was best considered as a meningococcus infection, in the course of which, if all those subjects in the "carrier" state were numbered among the infected, cerebro-spinal meningitis was a relatively infrequent incident. Few would be found to dispute the firmly grounded belief that infection was contracted by way of the naso-pharynx; but there was still scope for argument on the route taken by the meningococci in effecting further invasion from this bridgehead, and on the manner in which they reached the subarachnoid space, there to induce a suppurative inflammatory reaction in the leptomeninges. The more direct path was by way of the perineural sheaths of the olfactory filaments, which traversed the cribriform plate of the ethmoid bone. Such sheaths were formed by prolongations of the pia-arachnoid and placed the subarachnoid space and the naso-pharynx in direct communication. The advocates of the theory of direct extension of infection from the nose to the meninges objected to the hæmatogenous route of infection on the grounds that attempts at blood cultures were not infrequently unsuccessful, that positive findings by blood culture were not obtained with any greater regularity in the early stages of the disease than in the later stages, and that the arthropathies and visceral lesions which sometimes appeared as complications occurred relatively late in the course of events. The incidence of late complications had given rise to the suggestion that the blood might become secondarily infected from the meninges, and that such a contingency was not beyond the bounds of probability was shown by the work of Flexner, who found meningococci in the blood of animals subsequent to intraspinal injection.

Many workers had shown that a state of meningococcæmia was frequently established, and in Dr. Webster's own laboratory meningococci had been cultivated from the blood on many occasions, both in the current epidemic and in that which occurred during the war of 1914-1918.

Dr. Webster asked if he might be permitted to comment, in parenthesis, on the martial affinities of the meningococcus. Numbered among the dogs of war let slip at the "Cry, Havoc!" were the Gram-negative diplococci, of Neisser and Weichselbaum respectively; the gonococcus, *"semper paratus"*, required no mobilization; but the meningococcus exhibited a certain lag in the assembly of its forces.

Dr. Webster went on to say that the meningococcus was not an easy organism to grow; but he did not regard its cultivation as particularly difficult. There should be no failures in blood culture in the severe infections characterized by purpuric eruption such as caused the disease of an earlier day to be known as "spotted fever", but in the milder infections, in which the organisms were present in relatively small numbers, uniformly successful results in blood culture were not to be anticipated. With ordinary care, however, at least 25% of attempts at blood culture might be expected to yield a positive finding in the first week of the disease. The meningococcus had also been cultivated from the petechial spots, from endocardial vegetations and from other sources which it could not have reached by any means other than hæmatogenous infection.

Dr. Webster further said that ever since the event, discussion of meningococcal sepsis had always evoked for him vivid recollections of a post-mortem examination which he had carried out twenty-five years earlier, and for the purpose of the meeting he had consulted his autopsy record of January 26, 1917. The body was that of a boy, aged nine years, who was admitted to hospital *in extremis*, having been ill for four days. Purpuric blotches were widely distributed over the skin. A quantity of blood-stained, frothy, purulent fluid was found in each pleural sac; foci of recent suppuration of an average diameter of 1·5 centimetres were observed in the lower lobes of both lungs and numerous subpleural foci of miliary size were noted. The parenchyma of the basal portions of both lungs was in a state of advanced peptonisation, and the existing pyopneumothorax was attributable to the digestion of the pulmonary tissue, with discharge of several of the pulmonary abscesses into the pleural cavity. Multiple purpuric spots were present under the serous pericardium. No pericarditis or endocarditis appeared to be present, but a small suppurating focus was detected at the base of the papillary muscle of the mitral valve. Many small abscesses were present under the capsule of the liver, and a few were found within the substance of the organ. Similar fine points of suppuration were evident under the capsule of the spleen, while the appearances in the kidneys were those of suppurative pyelonephritis. Disintegrating pus cells and large numbers of meningococci were the features of smear preparations made from all the viscera mentioned as showing foci of suppuration. In the brain pronounced vascular injection of the leptomeninges was present, and although the cerebro-spinal fluid was turbid, there was no deposition of exudate. Numerous pus cells and meningococci were found in the deposit from the cerebro-spinal fluid.

Dr. Webster remarked that only ten days prior to the meeting the autopsy room had furnished a parallel to this example of meningococcal pyæmia in a post-mortem examination conducted by Dr. Williams on the body of a boy, aged seven years. Purulent pericarditis and purulent peritonitis were both determined to be of meningococcal origin, and the meningococcus was cultivated from a specimen of cerebro-spinal fluid secured by lumbar puncture *ante mortem*. Dr. Webster emphasized that in common with infections due to other pyogenic cocci, that induced by the meningococcus might terminate in pyæmia, and of all the microorganisms in the pyogenic calendar, none was endowed with greater lethal capacity than the meningococcus.

Dr. Webster went on to say that it might be accepted that systemic infection by the meningococcus was a frequent occurrence. Very remarkable were those instances of chronic meningococcus sepsis, one of which had come under observation at the Children's Hospital in February, 1941. The patient, a boy, aged nine years, was admitted to the care of Dr. W. W. McLaren, with the provisional diagnosis of rheumatic fever. The clinical history covering the period prior to the boy's admission was one of flitting joint pains present for two weeks, following an initial sore throat. During the ensuing three weeks the child exhibited several outbreaks of a roseolar eruption; his temperature rose every day to 103° or 104° F., and quickly subsided. In the afebrile intervals there was a notable absence of prostration. The total number of leucocytes was 10,000 per cubic millimetre; agglutination tests against the enteric group of micro-organisms, including *Brucella abortus*, shed no light on diagnosis. Meningococci were recovered by blood culture on February 26, 1941, thirty-three days after the onset of the illness. The effect of sulphapyridine therapy was an immediate cessation of the hitherto daily pyrexial attacks, and during the two weeks of the convalescent period the boy's temperature did not rise again. Two samples of blood taken in the interval prior to the child's discharge from hospital yielded negative findings on attempted cultivation. With regard to this particular child Dr. Webster said that although he was aware of the clinical condition, the possibility of recovering the meningococcus from the blood did not occur to him. He would have been saved such a lapse had he recollected the advice given in Zinsser's "Text Book of Bacteriology", that a diagnosis of meningococcus septicæmia should be seriously considered whenever a patient presenting prolonged fever, leucocytosis and a slight variable rash came under observation. The demonstration of meningococci in the blood, however, could not be regarded as evidence of infection of the meninges by the hæmatogenous route unless it could be shown that the blood was generally infected before the meninges; otherwise it was legitimate to argue that the blood stream infection was secondary to the meningeal invasion. Topley and Wilson

were of opinion that the number of cases studied with a view to determining the sequence of events was insufficient to enable any definite conclusion to be drawn. Although a coldly critical scientific analysis of the available evidence led to this position, the popular view was that the meninges were infected from the blood stream, either directly or from a metastatic lesion in the choricid plexus; but such a localization was not inevitable. Clinical evidence existed that a meningococcal septicæmia might occur without the development of meningitis, as in the case he had just quoted, and in one of his notable papers on the subject Herrick had stated that 4% of patients with meningococcal septicæmia escaped meningitis.

Dr. Webster then said that he proposed to give some attention to adrenal apoplexy, one feature in the morbid anatomy of meningococcus infection, and he showed a recently acquired specimen to illustrate his remarks. The specimen furnished an example of massive hæmorrhage affecting both adrenal glands, confined within the capsule, but none the less effecting destruction of the major portion of the glandular tissue. This condition was always likely to be found at autopsy on children who had died within twenty-four or forty-eight hours of the onset of an overwhelming meningococcal infection, in which extensive purpura had been a conspicuous feature. Undoubtedly meningococcus septicæmia was *facile princeps* among the toxic and infective states which culminated in the so-called adrenal apoplexy; but adrenal hæmorrhage might occur in varying degree in diphtheria, scarlet fever, measles and pneumonia. It had also been known to happen in new-born and still-born infants, and in those circumstances it was probably of mechanical or traumatic origin. Intramedullary adrenal hæmorrhage, with reduction of the glands to little better than sacs of extravasated blood, had come within Dr. Webster's autopsy experience at the Children's Hospital during the influenza pandemic of 1919-1920. The conjunction of the clinical features of fulminating purpura, profound prostration and circulatory depression, with the laboratory findings of hypoglycæmia and some elevation of the non-protein nitrogen content of the blood, had been held to constitute a syndrome upon which a diagnosis of adrenal apoplexy might be based. It had indeed been elevated to the eponymous register as the Waterhouse-Friderichsen syndrome. It might be allowed that an abrupt cessation of adrenal function, with resulting failure in carbohydrate mobilization and vasomotor control, might well precipitate the death of a child whose vital processes were already at a very low ebb from sheer intensity of toxæmia; but that a prediction could be made on clinical grounds as to which of a series of children exhibiting extensive purpura and dying of meningococcus septicæmia would be found to have hæmorrhagic adrenals and which would not, was open to question. It would seem also that little reliance was to be placed on the demonstration of hypoglycæmia and hypotension as indications of adrenal failure, particularly in a patient whose whole bodily economy was on the verge of disintegration. In the current epidemic eighteen children had died at the Children's Hospital from excessively virulent and purpuric meningococcal sepsis. In seven of these adrenal apoplexy had been found and in eleven it had not, and the clinician who could have separated the two groups would have been a veritable Daniel come to judgement. Dr. Webster suggested therefore that the so-called Waterhouse-Friderichsen syndrome implied a refinement of clinical diagnosis which was scarcely attainable.

Dr. Webster finally referred to the laboratory diagnosis of meningococcus infection. He said that in the fulminating type of infection meningococci had been demonstrated in films of the peripheral blood, prepared in the simple manner in routine use for a differential leucocyte count or a general appraisement of cytology. He recollected reproductions of startling films of this nature published by Middleton and Duane in *The American Journal of the Medical Sciences* as illustrations to their report of a case of overwhelming meningococcus infection. Local multiplication of the organisms was said to occur in the petechial spots, and films prepared from blood obtained by scratching such spots might repay the trouble. Dr. Webster had already given some consideration to blood culture, and he would add that bacteriological diagnosis might frequently be established by a post-mortem culture of the heart blood. In the main, laboratory diagnosis resolved itself into the demonstration of Gram-negative diplococci in the cerebro-spinal fluid. Meningococci might be numerous in films prepared from the deposit obtained by centrifuging; on the other hand, they might be few, requiring a protracted search for their discovery, or even eluding detection altogether. In his experience meningococcal meningitis occurring in sporadic manner had furnished most of those tantalizing specimens of fluid which abounded in pus cells but in which no bacteria were found, although the general appearance of the field suggested that the microorganisms on which diagnosis depended should take the microscopic stage at any moment. It had also been Dr. Webster's experience that a relative paucity or apparent total lack of microorganisms in the cerebro-spinal fluid, as judged by direct microscopic search, was more frequently encountered in meningococcal meningitis than in meningitis occasioned by infection with other pyogenic cocci or by the influenza bacillus. The prospect of successful cultivation of the organism from the cerebro-spinal fluid, if the use of a careful technique was assumed, depended largely on the stage of the disease. In the early phase, before the spinal fluid became purulent, the proportion of positive findings obtained by cultural methods was much lower than in later stages. By cultivation from macroscopically clear spinal fluid in the presence of meningococcus infection, it should be possible to obtain a positive finding for one-third of the specimens, from slightly turbid fluid for two-thirds of the specimens, and from frankly purulent fluid for little less than 100%. The efficacy of the Children's Hospital laboratory procedures might be judged from Dr. Williams's statement that bacteriological confirmation of the diagnosis of meningococcal meningitis had been provided in the case of 111 out of the 117 children so affected and included in his review. Of 19 attempts at blood culture, 17 yielded a positive finding, one of the two failures being a post-mortem attempt at culture from the heart blood. Twelve attempts at culture were made from specimens of cerebro-spinal fluid which were macroscopically clear and contained 25 cells or less per cubic millimetre; four of the twelve specimens of fluid of this type yielded a growth of meningococcus.

Dr. Webster then said that in meningococcal meningitis the presence in the cerebro-spinal fluid of a dissolved antigen or specific precipitinogen had been exploited, to furnish a means of rapid diagnosis. The technique was simplicity itself; it consisted in the gentle layering of a few drops of the supernatant centrifuged cerebro-spinal fluid on to a similar quantity of anti-meningococcal serum in a tube of small calibre, such as an agglutination tube. Usually a fine white opaque ring of precipitation became apparent within a few minutes; if it did not, the tube was incubated in a water bath for one or two hours at 37° C. Both Rake, who reported to the Medical Research Council of the Privy Council in Great Britain, and Maegraith, whose work was published in *The Lancet* in 1935, obtained satisfactory results by this method, the conspicuous advantage of which was its rapidity. In Maegraith's series of 120 cases a positive precipitin reaction occurred in 116, while there was no reaction in all but two of 180 control specimens of fluid.

Dr. Webster said that up to this point he had made little direct reference to Dr. Williams's demonstration. It bore the stamp of excellent work, carefully prepared and well presented; it had, however, one very regrettable feature, and that was that the occasion was the last on which Dr. Williams would appear before the Society as medical superintendent of the hospital. In composing his swan song, Dr. Williams had had to lead the theme through an intricate maze of variations in the shape of the manifold duties, preoccupations, cares and responsibilities which must have beset him in directing the work of the hospital during a very difficult period. It would have been a pity had someone not collated the lessons of the current epidemic of meningococcus infection, and by bringing to the task the same ability, patience and tenacity of purpose that he displayed in his work on pyloric stenosis, Dr. Williams had drawn to himself enduring credit. Dr. Webster was pleased to learn that Dr. Williams's paper would be published; all would thus secure a valuable permanent record and souvenir of his farewell appearance as medical superintendent.

LIEUTENANT-COLONEL J. M. HAYMAN, U.S.A.F.I.A., expressed pleasure at having the opportunity to be at the meeting, but said that he felt out of place amongst pædiatricians and unqualified to contribute significantly to the symposium. He had enjoyed the address thoroughly, and had listened eagerly to the comments and conclusions of a man who had had personal experience of 35 cases of juvenile meningococcal meningitis per year for three and a half years with so low a mortality rate as 10%. Colonel Hayman was surprised at the heavy incidence of the disease in the series in babies aged under six months and under one year; this had made him wonder whether those little patients had larger holes in the cribriform plates or were not old enough to have developed immunity. Colonel Hayman was grateful also to Dr. Webster, for until he heard from him his own thinking had been erroneous. He had always thought of

the disease as meningitis causing a 50% mortality rate, of a highly infectious nature, requiring isolation of the patient and a widespread search for the carrier of the germs. But now he understood that the germs were comparatively harmless and ubiquitous (perhaps everyone had them, and some people steadily), and that they were commoner in some places such as military camps, and that meningitis was a rare result of infection with them, the common result being naso-pharyngitis.

DR. FRANK SCHOLES, C.M.G., complimented Dr. Williams, not only on his informative paper, but also on the manner of its presentation and on the remarkable cinematograph film, which had been all too short. As one who had lectured on the subject at the Queen's Memorial Infectious Diseases Hospital for thirty years past, he thought that the film alone contained all the essentials, although it dealt only with infants and young children; it was the microcosm of the whole thing, and any differences that might be encountered were differences of degree and not of kind. Dr. Scholes went on to say that he claimed a long acquaintance with the subject under discussion rather than a great knowledge of it. He had spent a lifetime watching the effects of different methods of treatment on the course of the disease. He was not convinced that the nature of it had changed, nor that interepidemic cases differed from epidemic cases; perhaps they were less fulminating, but the patients came under treatment later. Before serum therapy was thought of, treatment comprised attempts at drainage only; but he could remember four consecutive recoveries, including that of his first military patient, with a petechial rash, which was thought to be measles. Then came serum treatment, and a fall in mortality rate followed, especially among patients from military camps; in one country a fatality rate of just under 5% was reported, but locally the rate was always between 40% and 50%. Nevertheless, the effects of serum therapy were apparent to those in the best position to judge. In the post-war period, until about 1934, among the odd inter-epidemic cases the fatality rate was about 50%. Then came the use of Ferry's antitoxic serum, and Dr. Scholes could recall one death in thirteen consecutive cases. He thought that serum was most effective when the onset of meningitis was fulminating.

Dr. Scholes then said that he would leave it to Dr. McLorinan, who was present, to refer to treatment with the sulphapyridine preparations at the Queen's Memorial Infectious Diseases Hospital, and to mention points that might be distinctive of the condition in adults as against children. Dr. Scholes complimented Dr. Williams on the low death rate of 20% among babies aged under one year; the figures were not so remarkable for the older children; nowadays the death rate was low also for young adults, but became fairly high again for older people. Dr. Scholes went on to say that he was glad that Dr. Williams had pointed out that it was the course and not the nature of the disease that had changed. Dr. Scholes, for twenty-five or thirty years, had distinguished three clinical types, exclusive of the chronic cases. The first type consisted of the fulminating malignant cases in which death occurred in one day. At autopsy the meninges were congested and œdematous, but no pus and little or no exudate was present; culture from the blood yielded a growth of meningococci. The second type was also acute and fatal within three days. Death was due to circulatory failure, and there were symptoms of encephalitis. Dr. Scholes had not thought of involvement of the adrenal glands, but that might have been missed. Extracellular diplococci were often found in the cerebro-spinal fluid on lumbar puncture twenty-four hours after the introduction of serum, and he had given up its use as a "bad job". He regarded great restlessness rather than delirium as a bad prognostic sign. A purpuric rash rather than small petechiæ was also serious. Early coma was not necessarily a prelude to death, even in the acute cases. The third type of acute case was the most distressing; it included the progressively purulent lesion, in adults progressing to merciful death in a week or ten days, but in infants going on to hydrocephalus and post-basic meningitis. As Dr. Williams had said, that third type need no longer exist; correct early diagnosis and modern treatment would abolish it.

Dr. Scholes then outlined the indications and principles on which rational modern therapy was based. He said that those patients who were being overwhelmed by an immense toxæmia were likely to die, and the great need was to prevent death on the first day or so. In less acute cases they could expect good, rapid recovery with appropriate early treatment; but when pus had formed and was sticky, sulphonamides would not make much difference. Similarly, in diphtheria, antitoxic serum saved patients with a fulminating infection and without sequelæ, saved the second group, but perhaps with paralysis as a complication, and made little difference in the third group. They could not do much, then, for those patients when irreparable damage had been done. Chemotherapy would cure the great majority of other patients, and without complications or sequelæ; but Dr. Scholes wondered whether chemotherapy was good enough treatment in the early fulminating cases. Many of the patients recovered; but in order to leave no therapeutic stone unturned it would probably be beneficial to give specific antitoxic serum by the intravenous route. Unfortunately, Dr. Scholes thought that there was no stock available at present. It was time that the use of antibacterial serum in meningococcal infections became a custom that had died and been buried.

Dr. Scholes commented on the changes in human relations with bacteria as the decades went. Since chemotherapy was used for everything and was often given in small dosage, the power of bacteria to acquire resistance might increase, and the existence of resistant strains might be a future menace. Those strains would be likely to become the surviving ones and to produce the disease of the future. Sulphapyridine resistant strains of gonococci and pneumococci were already known. Dr. Scholes's final advice was to avoid starting with a dosage that was too small and to be careful not to continue chemotherapy for too long; thus they might attempt to prevent meningococci from becoming resistant to the drug.

CAPTAIN L. H. BRONSON, U.S.A.F.I.A., said that the meningococcus was highly susceptible to the sulphonamide drugs, but the possible explanation of the variations mentioned by Dr. Williams was that there was a varying lethal concentration. Working with staphylococci, he had noted that with a concentration above five milligrammes attempts at culture were unsuccessful and the number of cells fell, whereas with a concentration below five milligrammes, cultures were obtained and the number of cells rose. Captain Bronson also suggested that the unexplained fever referred to by Dr. Williams was perhaps the drug fever they sometimes saw with sulphapyridine therapy. With reference to complications, he said that there had been relatively few instances at the American hospital; but out of four cases, arthritis had been the complication in two, ophthalmitis in one and bilateral deltoid paralysis in the other.

DR. H. MCLORINAN, after offering his congratulations to Dr. Williams, referred to the erratic infectivity of meningococci. He said that meningitis was rare in naso-pharyngeal infections. It was comparatively rare for more than one member of a family to have meningitis at the same time. However, he remembered admitting a mother to hospital one night and her child the next day; they recovered after oral treatment with sulphapyridine. The position was somewhat similar to that of nephritis as a complication of sore throat. Dr. McLorinan then discussed the causes of typical meningitis. Cold and fatigue played a part. It was the new recruits in a camp who had the symptoms; badly ventilated huts and similar environmental factors probably predisposed the victims of meningococcal infection to meningitis. The cause of one death that had occurred at the Queen's Memorial Infectious Diseases Hospital was acute respiratory failure on the second or third day, perhaps bulbar in origin. Another death appeared to be ascribable to tolerance to sulphapyridine, the result of the administration of a small dosage over a long period; it was therefore advisable to hit hard and to risk over-dosage. With older children they had had few difficulties, apart from the toxic effects of chemotherapy, which he believed to be exaggerated. The nurses gave it to the children by mouth, forcefully if necessary, and if it was vomited within three-quarters of an hour the dose was repeated. With the exception of fulminating cases, they did not resort to the use of soluble salts. Dr. McLorinan added that he had always had a wholesome respect for intravenous therapy. They had been immensely struck with the erratic behaviour of the temperature charts, which were often not in accord with the symptoms in convalescence; the rise in temperature might persist for three weeks, and might occur after the use of the drug had been stopped. Of their patients few had had normal cerebro-spinal fluid within seven days; at that stage the number of cells varied from 90 to 1,000 per cubic millimetre. A few still had abnormal fluid at the end of the second week, with the cells numbering between 60 and 300 per cubic millimetre; and some specimens of cerebro-spinal fluid at the end of the third week contained approximately 6 to 100 cells per cubic millimetre. In spite of those findings the patients might be quite symptomless, feel well and recover completely without any setback. As convalescents they were cheerful and optimistic; some said they had headaches and some had joint pains, but they made light of them, realizing that they were recovering from what might have been a fatal illness. It was to be hoped

that some day a drug would be found which was less unpleasant in its effects.

LIEUTENANT JOHNSON, U.S.A.F.I.A., said that he had had recent laboratory experience of a series of 57 people who had been in contact with typical meningitis, and in the initial attempts at cultures 62% were proved to harbour the meningococcus. They all had sulphathiazole treatment for three days, and of attempts at culture made two days later, 5 out of 24 still gave positive results. Then, as in the last war, extensive attention was paid to the naso-pharynx, the 24 were subjected to spraying, and further attempts at culture were made. Two of the five subjects previously "positive" were then "negative"; but 7 of the 19 previously "negative" were "positive". Lieutenant Johnson felt like a Don Quixote tilting at a windmill.

DR. J. W. GRIEVE congratulated Dr. Williams. He said that everything Dr. Williams did he did well, and that he had practically covered the whole ground. Dr. Grieve emphasized the clinical importance of the tendency to dehydration and to circulatory failure. He had experienced many phases in methods of treating meningitis, but none were like the sulphonamides. He had hitherto been impressed by the liability to sequelæ, but not recently. It was difficult to supervise the management of the patients when serum was the chief therapeutic agent. Early diagnosis was difficult with babies, and the death rate was higher. Unexplained vomiting and change in temperament were important diagnostic points and indicated lumbar puncture. At that stage Dr. Grieve said that he did not propose to make further reference to the clinical aspects, which had been so well covered by Dr. Williams and the previous speakers; but he wished to take the opportunity, as the secretary of the Melbourne Paediatric Society, to say how he regretted losing the services of Dr. Williams as assistant secretary. Dr. Williams had made the work of the society easy and had done an efficient job as medical superintendent, thus proving a worthy successor to Dr. Vernon Collins, who had set a high standard for him to follow. Dr. Grieve offered Dr. Williams his best wishes for future success in the practice of medicine.

DR. ROBERT SOUTHBY said that there were a few clinical points of interest that he wished to mention. It should be remembered that when a sick baby was frowning a lot and had had convulsions at the onset, those convulsions might be persistent, and the baby might die within twenty-four hours without other evidence of meningitis. Infection of the blood stream probably occurred before that of the meninges. In the very fulminating cases the organisms would be grown on culture, and death might occur before the manifestation of any cerebro-spinal signs. In other cases true meningismus was present and the cerebro-spinal fluid, though under pressure, was sterile; later signs of meningeal irritation developed, with increased cell content, but no organisms in the fluid, and then true meningitis developed.

Dr. Southby also pointed out that if a feverish child complained of headache, and if sinus infection could be excluded, the doctor should take notice of the complaint of headache as a possible guide to the diagnosis of meningitis. He referred to a child, aged five years, who was examined by a colleague when feverish and complaining of anorexia and headache; three hours later she was more seriously ill, and a second doctor who saw her sent her to hospital, thinking that she had the early signs of pneumonia. Dr. Southby saw her after a further three hours because her condition had deteriorated. The temperature was 103° F., the pulse rate was 100 per minute and the respiratory rate approximately 60 per minute. She looked ill and some petechial spots were present; these findings led Dr. Southby to suspect meningococcal meningitis. The patient was sent to the Queen's Memorial Infectious Diseases Hospital, and there the diagnosis proved to be correct. Dr. Southby believed that, though the respiratory rate was rapid, the low pulse rate had influenced his decision.

Dr. Williams, in reply to Colonel Hayman, explained why there were relatively more patients in the series under the age of six months than would have been expected; the series had included an epidemic in which an institution was involved, almost limiting the epidemic to infancy. Perhaps the resistance of the subjects had been lowered in a way comparable to the effect of cold as a factor leading to pneumonia. Dr. Williams agreed with the views of Dr. Scholes on circulatory failure; he liked in such circumstances to give large amounts of antitoxic serum by the intravenous route. The importance of early diagnosis had been well brought out in the discussion. In conclusion, Dr. Williams thanked the members for the cordial reception of his address and for their remarks about himself.

Public Health.

PARLIAMENTARY JOINT COMMITTEE ON SOCIAL SECURITY.

THE Parliamentary Joint Committee on Social Security was appointed "to inquire into and from time to time report upon ways and means of improving social and living conditions of the people of Australia and of rectifying anomalies in existing legislation". The personnel of the committee is as follows: Mr. H. C. Barnard (Chairman), Senator Cooper (Deputy Chairman), Senator Arnold, Mr. Maurice Blackburn, Colonel R. S. Ryan and the Honourable J. A. Perkins.

The committee has been taking evidence in Melbourne from members of the medical profession and it is proposed to publish in this journal from time to time a summary of this evidence as it becomes available. In this issue we publish summaries of the evidence given by Air Vice-Marshal Victor Hurley, Director-General of Medical Services of the Royal Australian Air Force, Sir Henry Newland, President of the Federal Council of the British Medical Association in Australia, and Dr. J. H. L. Cumpston, Director-General of Health, Commonwealth Department of Health.

AIR VICE-MARSHAL VICTOR HURLEY, on being sworn, said he desired his evidence to be given in public. He had no prepared statement to submit to the committee, but he presumed that certain changes which were being advocated would depend upon constitutional alterations.

The Chairman stated that, failing constitutional alterations, the only way in which the States could carry out advocated changes in health services would be by the payment of grants-in-aid by the Commonwealth, but the committee would like guidance regarding an approach to the question under the existing Constitution.

Air Vice-Marshal Hurley said that under present conditions everyone in the community could obtain medical service of some sort, the poorer in public hospitals, others privately, and in some cases, for example, in the outback, Governments had provided medical services. Medical and health services were inevitably linked with the general financial status of the community, and if every citizen had the necessary funds, all could get the best. Hospital and specialist services were, however, costly and many could not, from their own resources, meet these costs.

The friendly societies provided some services for their members, but doctors realized that the lodge service was a limited one which did not cover long or serious illnesses or necessary investigations. The doctors and the knowledge existed, the problem was to bring that knowledge to the public. Was it to be done through the friendly societies or by a salaried service or by some system of national health insurance?

Different countries had attacked the problem in different ways. Britain had adopted a system of health insurance which, although criticized, had, Air Vice-Marshal Hurley considered, given a better service than was previously available. Extension of the British scheme was now contemplated, its main defects being that it provided only for the insured person and not for his family and did not supply an adequate specialist service. He was not familiar with the details of the New Zealand scheme, but, again, that country had approached the problem in a different way.

In reply to a question from the Chairman whether he had given thought to the lines on which a medical health scheme for Australia might be effected, Air Vice-Marshal Hurley said that certain principles must first be determined. Was the Government to be responsible for such a scheme out of general revenue by the provision of a salaried medical service on the lines suggested by the National Health and Medical Research Council? Or was a system of national health insurance to be established? Or by piecemeal additions to the present system, so making it more effective, could the end desired be achieved? Would it be reasonable for Government to accept all the responsibility or should some be imposed on the individual and thrift be encouraged?

Air Vice-Marshal Hurley's view was that there should not be rigid income limits, and just as anyone could insure his life, why should the individual not be free to insure against sickness? He considered that anything free was likely to be abused, not so highly regarded and not so effective as a system which imposed some or all of the responsibility on the individual. He felt that any system of national health insurance would have to be compulsory and applicable to the whole community.

Asked how he considered the less fortunate could be covered in a comprehensive scheme, Air Vice-Marshal Hurley said that in a salaried service the problem did not arise, but if a contributory scheme was established, those unable to pay might be covered by Government subvention.

Asked by Senator Cooper whether in his opinion a salaried service would be as good as a panel system, Air Vice-Marshal Hurley said that the salary would have to be adequate and the conditions of service such as not to hamper doctors in their medical work. Doctors feared to be part of a department, and the more administration could be divorced from direct departmental control, the better. If such a scheme were introduced the control should be by a small Federal body on the lines of the State Electricity Commission or the Council for Scientific and Industrial Research.

Asked by Senator Cooper whether provision of doctors available to all would not lessen the cost of hospitals, on which so much was being spent, Air Vice-Marshal Hurley said that had been the hope when national health insurance was introduced in Great Britain, but it had not eventuated.

The early diagnosis of tuberculosis and the elimination of such diseases as typhoid fever would affect the position, but everyday sicknesses would still require hospital care.

He thought that the establishment of clinics, as envisaged in the National Health and Medical Research Council scheme, would result in improvement by the pooling of facilities which doctors and patients could now obtain only from perhaps several separate specialists or from public hospitals. Better service at lower cost could be provided at investigational centres which the Government could foster and subsidize, and doctors would support such a proposal.

Asked by Senator Cooper whether the organization of such facilities could not be proceeded with despite the absence of many doctors on service, Air Vice-Marshal Hurley said he could see no objection to the establishment of such facilities now. Doctors returning from the war to their former areas of practice hoped to fit back into their practices, but instead of having individual surgeries, centres might be established where they could work with special facilities, such as radiological and biochemical, available.

In reply to Senator Arnold, Air Vice-Marshal Hurley stated that the British scheme failed in that it made no provision for wives and families and no adequate specialist services were provided; any Commonwealth scheme should make those provisions. Under the scheme proposed by the National Health and Medical Research Council a public health officer would be the area controlling officer, but in general he would be an administrative officer not qualified to provide actual medical service to patients.

Air Vice-Marshal Hurley considered that in a salaried scheme there would be a danger of research and initiative being stifled and for that reason control should not be departmental. Promotion should depend on skill and ability and doctors themselves were the best judges. Any such scheme should make provision for the advancement of brilliant people.

Asked by Senator Cooper how such matters could be safeguarded, Air Vice-Marshal Hurley thought that some system of selection by recommendation of a special advisory body, such as functioned in teaching hospitals in regard to staff appointments, might be satisfactory.

Replying to Senator Arnold, Air Vice-Marshal Hurley agreed that, if the Government decided on a salaried service, control should be divorced from any Government department.

He considered there was no escape from the fact that people liked to choose their own doctor and that choice was more than a matter of sentiment. Free choice had sometimes a marked effect on recovery, and he could not see how there could be any choice of doctor in a salaried service. He thought there would be no difficulty in examining and "card indexing" the whole community, and that such a system would be of value. Any such records must be confidential and any system involving masses of records would not be acceptable to the medical profession.

Replying to Mr. Perkins, Air Vice-Marshal Hurley said that many defects, unknown to the men themselves, were detected in Service examinations and such examinations had proved their worth. The National Health and Medical Research Council scheme had not tackled the hospital problem, but he agreed with Mr. Perkins's view that under a salaried service the demand for hospital accommodation might increase.

The Chairman having stated that the committee was concerned with the question of extension of health services to the community, and particularly with what additional medical services could be introduced at once, Air Vice-Marshal Hurley said, having regard to the absence of men on service, that he thought the question of group practice and national fitness might be taken up. It would, however, with the present shortage of civil doctors, be impossible to do very much. One of the present defects was the cost of hospitalization and for many those costs could be met only by some contributory system.

Child welfare was being handled in a small way at present by the Education Department and baby health centres which had justified their existence.

The problem of tuberculosis was difficult and expensive, and if examinations were to be made of the community in general, more sanatorium accommodation would be necessary, and family allowances would have to be provided. Much more could be done than was being done at present, and some government should accept responsibility for the problem now. Also, the treatment of venereal diseases could be organized on a more effective basis.

Asked his opinion of the system of medical practice at Yallourn, Air Vice-Marshal Hurley said it worked fairly well, but the special favourable conditions obtaining in the area had to be remembered. He knew little of the Tasmanian system, but it appeared to have accomplished some of what was hoped for by its sponsors. In regard to group practice and specialist facilities, he thought that if centres were established some of the specialist appointments at those centres would have to be on a salaried basis, but many, possibly, could be on a part-time basis.

The alternatives to a panel system were a salaried service and extension of the existing system of private practice.

In reply to Senator Arnold, Air Vice-Marshal Hurley said he did not know of any organized farm colonies in association with tuberculosis sanatoria. Tuberculous rejects from the Services were advised to see their own doctors, who were supplied with information on request. If sanatorium treatment was necessary, men were advised to seek it through the State authorities, but the accommodation was, he thought, inadequate.

In concluding his evidence, Air Vice-Marshal Hurley referred to the problem of rehabilitating medical officers who would be discharged from the Services at the end of the war, and considered that in the interests of these men and of the community it would be necessary to organize post-graduate and refresher courses for doctors on demobilization.

SIR HENRY NEWLAND having been sworn, the Chairman said the committee had received a letter from Sir Henry Newland stating that he could not at that stage give evidence on behalf of the British Medical Association, but the committee would welcome any evidence helpful to it.

Sir Henry Newland said he wanted to impress on the committee the attitude of the British Medical Association towards changes it regarded as imperative and that the interest of the British Medical Association in those matters was no new thing.

The Chairman said that any new set-up of health services could not hope to succeed without the cooperation of the British Medical Association and the considered view of the Association was wanted.

Sir Henry Newland said the British Medical Association was equally anxious to cooperate with the Government. Preventive and curative medicine were not static and the first indication of change was the contemplation of a national insurance bill by the Lyons Government which promised consultation with the Federal Council. In the interval between the giving of that promise and the introduction of the bill he and Dr. Smeaton drew up a bill including some of those things now advocated by the National Health and Medical Research Council years before that body was formed.

When Sir Walter Kinnear arrived in Australia a conference was held between him, the Federal Council and representatives of the Government, and the British Medical Association was not then opposed to the introduction of a national insurance bill, but the medical benefit proposals were disappointing and many things were omitted. Those medical benefit proposals were submitted to Branch Councils of the British Medical Association, which at Government request were pledged to secrecy, and that obligation was unfortunate, as the profession at large was not informed. That lack of information led to dissatisfaction and a Royal Commission was ultimately appointed. In view of previous experience he appreciated the course the committee was following in hearing evidence from members of the profession.

The Federal Council had recently devised a plan for a national health service and an interim report of the Medical Planning Commission in Great Britain had been published in June of this year, but unfortunately the issue of the *British Medical Journal* in which it appeared had been lost in transit and the report was not available.

The plan for a salaried service prepared by the National Health and Medical Research Council had been before the Federal Council in 1941, but the entry of Japan into the war had resulted in the abandonment of a Federal Council meeting and consequent delay in consideration of the plan. Further, the Federal Council, having adopted another scheme, was not disposed to consider seriously a salaried service, and the question whether the introduction of such a service was desirable had not been considered by the Branch Councils nor by the Royal Colleges of Surgeons and Physicians.

The Federal Council had requested him to confer with the Presidents of the Colleges, but that conference had not yet been held.

The British Medical Association recognized that a national health service was necessary, but it was undecided as to the form it should take, as it was not known whether such a service was to be a free one as in Russia and New Zealand.

Sir Henry Newland informed the committee that he had that day received a statement from the New South Wales Branch on the future of medical practice which at the request of the Chairman he read to the committee.

Asked by the Chairman if there were any further observations he would like to place before the committee, Sir Henry Newland submitted a resolution of the Federal Council stressing the importance of the economic factor in the case of sufferers from tuberculosis and referred to the lack of adequate provision for the care of persons afflicted with chronic diseases and the necessity for research into such diseases. He deplored the fact that the Federal Government in making provision for the assistance of university students, had omitted to extend that assistance to enable students to reside in university colleges, the corporate life of which was invaluable, especially to those pursuing courses of education.

He considered that in any national health service, as the war had shown, the effect of speed in modern life could not be overlooked, and as in war, so in civil life, a national transport service should be established to supply first aid and blood transfusion services and to move patients to hospitals. He was of the opinion that large hospitals might be placed outside big cities and that maternal welfare and the proper training of doctors in obstetrics were most important.

In reply to Colonel Ryan, Sir Henry Newland said that the report from the New South Wales Branch which condemned a salaried medical service was largely in accord with his own views.

He agreed that Army doctors, on salaries, did not lack incentive, nor did their ability suffer, but conditions in the Army were quite different from those of civil life.

He thought that a bureaucratic element in a salaried service would largely abolish intimate personal contact with patients, although a departmental system might deal adequately with the preventive side of medicine. He felt that one of the advantages of the New Zealand scheme was the maintenance of close association between doctor and patient.

In existing friendly society practice the patient had choice of doctor, and although the National Health and Medical Research Council claimed that under its scheme a patient could choose a salaried doctor, he failed to see how that would be possible.

He did not see any reason why honorary staffs should not in future be paid and thought that modern transport would overcome any difficulties caused by removal of hospitals from large cities.

Asked by Senator Cooper whether he thought any type of health service could be implemented at present, Sir Henry Newland said such would be possible but undesirable, because doctors on service and overworked civil doctors had not been able to consider the proposed changes. He thought the opinions of men on service might be obtained through the service authorities.

He felt that group schemes were essential to bring the benefits of modern medicine to patients, especially when investigations were necessary, but did not agree that doctors working in groups need be salaried, although in isolated areas certain specialists, such as radiologists, might have to be subsidized.

Asked whether the salaried system should be on a panel or fee basis, Sir Henry Newland said it would first be necessary to determine whether the service was to be free to everybody. If so, it could be on a panel system or a fee-for-service basis as in New Zealand, where both alternatives were operable, but personally he favoured the fee-for-service plan.

If a salaried system was established, he thought it should be controlled by a statutory commission divorced from the Civil Service, but doubted whether the setting up of an advisory board to deal with questions of promotion, on the lines of boards which now advised public hospital committees in the selection of their honorary staffs, would work so successfully in a salaried medical service as it did in hospitals.

He was certain that any attempt to transmute the Emergency Civil Medical Practitioner Service into a general salaried medical service would meet with the greatest opposition.

In reply to Senator Arnold, Sir Henry Newland stated that in his opinion improvements in health in Great Britain were attributable more to improved housing and sanitation than to national health insurance. He thought every school should have a good playground (many of the South Australian schools were miserably provided with playing facilities), as it was in the playgrounds that character was developed.

He was not prepared to offer any opinion as to whether any system of medical care which might be introduced should be free; but whatever the system, it should be thoroughly efficient and cover the unemployed and unemployable who probably needed more care than the employed.

He felt that a private patient, if he could afford it, preferred to go to a private hospital, a belief supported by the fact that at present there was an unprecedented demand for private beds owing to the amount of money now available to the community. He was sure that if a free system was introduced those who could afford not to would not use it. He thought that none but unscrupulous doctors would over-treat patients in a free service which paid doctors on a fee-for-service basis. He maintained that a salaried service was fundamentally wrong because it neglected the family as a unit and the close association which must exist between doctor and patient.

Replying to the Chairman, Sir Henry Newland said that he had some knowledge of the Tasmanian system of salaried doctors and the British Medical Association recognized that in isolated areas such a system worked quite well.

(The Chairman stated that in Tasmania there was a clamour by the people for extension of free medical services.)

Sir Henry Newland's experience of *questionnaires* did not lead him to think that the views of men on service could be obtained by *questionnaire* and he did not expect that the views of the Federal Council on the National Health and Medical Research Council proposals would be available before February, 1943, at the earliest.

The Federal Council representative on the National Health and Medical Research Council had not signed the report of that Council on a salaried medical service, because the profession had not been consulted in the matter.

Both he and the British Medical Association favoured group practice, which would save patients both time and money.

The British Medical Association had not considered the question of "clean bill of health" certificates before marriage.

In reply to Colonel Ryan, Sir Henry Newland said that compulsory yearly health examinations had advantages, but in making people "health conscious" there was a risk of making them unhealthy.

In conclusion, Sir Henry Newland stated that he did not wish there to be any misunderstanding of his attitude. He did not favour the introduction of a free medical service, but if it were introduced, he thought it should be on the lines of the system operating in New Zealand.

DR. J. H. L. CUMPSTON, Director-General of Health, Commonwealth Department of Health, Chairman of the National Health and Medical Research Council, and Director-General of the Emergency Civil Medical Practitioner Service, being sworn, stated that the National Health and Medical Research Council at its recent meeting had, at the request of the Parliamentary Joint Committee on Social Security, discussed for nearly a day the question whether any part or all of its scheme for a salaried medical service should be introduced during the war and had resolved: "That the Council reaffirms the principles contained in its outline for a possible scheme for a salaried medical service, but believes it is the proper course to wait the results of the constitutional discussions before elaborating any proposals for the change of medical practice in Australia."

The reason for that resolution was that no decision could be reached until it had been decided whether the Commonwealth could act in certain fields, for example, the control of hospitals. If the Commonwealth had no power to control hospitals, it was, he considered, useless to discuss the matter further. For the same reason the Council deferred consideration of matters pertaining to child welfare, tuberculosis and the domestic service of doctors, but it was prepared to

meet again as soon as the position was clarified. He desired the committee to know, however, that the Council was influenced by another important consideration—that it would be inequitable and unjust to introduce any scheme which would disrupt the affairs of doctors with one-third of them away on service.

In reference to the scheme proposed by the Federal Council of the British Medical Association, the fact that the Federal Council had referred to the Branch Councils a scheme prepared by a subcommittee of the Victorian Branch Council led to the inference that the Federal Council had various proposals under consideration and had progressed beyond its published proposals, which he considered were too general and neglected problems of administration. He felt in any approach to the matter of the provision of medical services to the people that the following considerations were fundamental:

1. The problem of doctors returning from service had been referred to in the published report of the last meeting of the Federal Council which recorded General Burston's approach to Sir Henry Newland on the matter.

2. Whatever scheme was devised and however a theoretical reconstructor might approach the question, under no conceivable legal powers could doctors be compelled to join a scheme, and if its conditions were not acceptable, the greater part of the profession would not participate or a poor quality of doctor only might accept service under it.

Dr. Cumpston was of the opinion that the recent decision of the Commonwealth Government to subsidize students would imply a system of selection at the leaving certificate stage, a paternalism during the courses of those selected and a paternalism after graduation, as he could not see how an authority providing the money could drop a man at the end of his course. From his long experience he considered that some authority must undertake the provision of medical care to persons in the remoter parts of the Commonwealth, and felt that many of the criticisms and comments on the National Health and Medical Research Council scheme were coloured by a metropolitan outlook which had not visualized the need for a good service in remote areas with the provision of consultants available to people in outback areas. Any scheme adopted would have to be introduced in three or four stages—first to the remote country districts, next to country industrial areas and finally to metropolitan areas. (Dr. Cumpston submitted to the committee a map of Australia on which were demonstrated the sparsely populated areas.)

Discussing the Emergency Civil Medical Practitioner Service, Dr. Cumpston said that, at the beginning of the war, despite the obvious need to call up doctors for the Services, it soon became apparent that grave dislocation might occur if men entered the Services indiscriminately, and for that reason the Central and State Medical Coordination Committees were established. Later the need for controlling civil practice became obvious and the Emergency Civil Medical Practitioner Service was established in which all doctors under the age of sixty years were now enrolled. The Service was working satisfactorily and had met the needs of eight remote areas where salaried doctors had been placed.

Replying to the Chairman, Dr. Cumpston said that on account of the number of doctors on service no action should be taken now to establish a salaried medical service, but activities in relation to child welfare and tuberculosis might be started if the constitutional position was clarified.

Asked by Senator Cooper whether it would be a good idea to prepare now the framework of a scheme into which demobilized doctors could at once fit at the end of the war rather than allow them to return to their practices and perhaps absorb them into a scheme two or three years later, Dr. Cumpston said that there would be a failure of duty if the issue was not faced and that all proposals should be discussed. He had noted that the Federal Council had agreed to discuss plans with the trades unions and other bodies, but had not mentioned discussion with the National Health and Medical Research Council. He reiterated his opinion that any proposal would be upset if it did not have the backing of the body of the profession and for that reason he could not say whether a salaried medical service would be the best method of absorbing returned medical men.

The National Health and Medical Research Council objected to a *per capita* system as proposed in the *National Health and Pensions Insurance Act*, as under such a system the medical man descended to the lowest possible grade of remuneration and service with an army of clerical policemen in control, exemplified in Great Britain where the national insurance system had become a method of policing the medical profession in an undignified way. To ask a doctor to contract to see a patient for twopence halfpenny a week was debasing and Australia had the highest grade of domestic private practice of any country he knew; it would be debased by a national insurance system under which a doctor tried to get as many patients as possible on his panel to make up for the low remuneration.

To him the New Zealand system appeared half-baked, and if a government said it had a duty to provide a service to everybody he could not personally see any alternative to a salaried service which, like education, should be free, but just as private schools existed so could private practice for those who desired it. He failed to see that ambition would be stifled or the quality of service affected under a salaried system, which he thought should be controlled by a Minister with a permanent departmental head with safeguards against nepotism.

Speaking of hospitals, Dr. Cumpston thought they should be under direct Commonwealth control and foresaw difficulties in uniformity of application of any grants-in-aid made to the States.

In regard to post-graduate courses for service doctors at the end of the war, Dr. Cumpston stated that although such courses were held after the last war for Australian doctors in England, after this war the position would be different, as most of the doctors would be in Australia, the numbers would be greater and it might impose hardships to delay demobilization for months while such courses were being undertaken.

Replying to Mr. Perkins, Dr. Cumpston considered that the state of health in Great Britain in 1911 was such that almost anything would have improved it, and as other influences in addition to national insurance had been operating since that time, he could not say whether any improvements in the health of the nation were attributable to national insurance.

He thought that no voluntary system could be launched unless sufficient doctors were prepared to serve under it, and if any scheme was to succeed the willing cooperation of the profession would have to be obtained. He could not say whether the New Zealand scheme would be acceptable to the profession. He considered that extension of the bush nursing scheme would assist in remote areas, but thought it needed improving as it stood alone, was constantly in financial difficulties and was not related to official systems of hospitals.

The peace-time ratio of doctors to population in Australia was, he thought, adequate.

In reply to Senator Arnold, Dr. Cumpston agreed that plans should be made on the assumption that the necessary powers would exist and that the Commonwealth Government should be asked to obtain those powers.

Asked by Senator Arnold whether if the profession desired, it could defeat any system, and if such a position should be accepted, Dr. Cumpston asked what alternative there was to that position as this country was not totalitarian.

He had enough pride in his profession to be sure that nothing but the sheer conviction of the medical profession that something worthwhile nationally was being introduced would be of any use.

Dr. Cumpston stated that in forty years of professional life he had seen nothing to justify the statement that medical service to the people might suffer because doctors were more interested in fees than service and he regarded such a statement as a grave libel, except in isolated instances.

Years of experience had put beyond doubt the argument that doctors preferred honour in their own profession to financial gain, and he could not see that such feeling would change in a salaried service. In such a service post-graduate work would be an integral part of the system which should be under a central authority with control in each State vested in a small group of senior professional men. He would not have any lay control, as doctors were as intelligent as other members of the community and could handle administrative matters, as they had demonstrated in the Army and Emergency Medical Services, and associated lay control led to rivalry as shown under the national insurance system in Great Britain.

He was not in favour of keeping personal health records of all citizens and saw no need for a dossier system. Since 1911 he had made repeated proposals for dealing with tuberculosis, which could be made as scarce as typhoid fever, but economic conditions and lack of accommodation hindered progress. If sufferers could be told that their wives and children would be looked after and contacts were taken care of, it would be possible to get somewhere. That meant money and organization—and not very much of either. Adolescence, the first years of industrial life and the closing years of life were the important times, and it would be easy to organize

a system of examination. Decent accommodation with safeguard of patients' economic conditions was the essential; now the community gave them nothing but the invalid pension.

Theoretically a compulsory system of health examination was better than a voluntary system, but the rights of citizens should not be infringed.

Dr. Cumpston then described to the committee the work which was being done by a group of doctors in the Adelaide hills, work which was as good an answer as any that could be given to the charge that the medical profession was mercenary. In that area ten doctors had voluntarily offered to conduct as a communal service a five-year campaign under which 3,814 children were being regularly supervised and examined.

In reply to Colonel Ryan, Dr. Cumpston agreed that the care of the health of the masses was desirable, but he did not want to suggest that hitherto nothing had been done in this country, which had a high standard of medical practice; it would, however, be wrong to remain content with that standard. He thought the committee should seek the powers necessary for the purpose, but reminded the committee that even with its present constitutional limitations the Commonwealth had established the Commonwealth Serum Laboratories, the X-ray and Radium Laboratory and twelve other laboratories and a School of Tropical Medicine, and had, in addition, bought a large quantity of radium.

He agreed that the proper duty of the Commonwealth was to secure a high standard of health for the community, but medical services were only part of the requirements necessary. He did not consider that any except hypochondriacs would make unnecessary demands on a free salaried medical service.

Referring to the criticism that in a salaried service a doctor would be moved about and not get the know the background of his patients, Dr. Cumpston expressed the view that the value attached to that aspect of practice was over-rated and actually, in many cases in remote areas, there was little continuity of service as doctors did not stay in those areas longer than they could help.

He agreed that sickness benefits should be divorced from medical benefits in any scheme and thought that the standard of certification would be better under a salaried service. In such a service over-centralization should be avoided and the National Health and Medical Research Council scheme provided for local autonomy under professional groups.

Replying to Mr. Barnard, Dr. Cumpston was sure that the medical profession would welcome measures for the adequate care of sufferers from tuberculosis. He felt that as a nation we were neglecting our children and would like to see appointed a small group of experienced persons to set to work quietly to collect facts in relation to what should be done, especially for pre-school children.

Correspondence.

THE ROYAL AUSTRALASIAN COLLEGE OF PHYSICIANS AND A SALARIED HEALTH SERVICE.

SIR: In the leading article of your journal dated November 14, 1942, page 438, on the subject of the meeting of the Federal Council of the British Medical Association, the following statement is made: "On the other hand the disturbing information was given that at least one prominent member of the Royal Australasian College of Physicians had taken steps to inform the Government on certain aspects of a salaried service. This is very much to be regretted. Although no fair-minded Government Minister would suppose for a moment that the opinions of a single individual could be taken as representing those of the whole profession, the views of one influential person at variance with those of the majority can do much harm."

This statement has no application to any office bearer or member of the Executive Committee of this College. If any prominent member or members of this College have informed the Government on any aspects of a salaried service, then they have acted in a purely private capacity, without any authority from the College and without the knowledge of its Council.

I beg to put before you the following information as to the attitude and activities of this College on this question of a national medical service. The Councils of the two Colleges met on September 27, 1941, at Melbourne and discussed the original recommendations of the National Health and Medical Research Council on the reorganization of the medical profession. The opinion was expressed that it was most important that the action which the two Colleges eventually decided to take should be discussed with the Federal Council of the British Medical Association before finality was reached.

The only official approach made direct to the Government was an interview with the Minister of Health by the then President of the College on some date prior to January 23, 1942, and correspondence with him and with the Prime Minister. The object of this interview and correspondence was to impress on the Government the injustice and impracticability of finalizing any scheme of national medical service until the medical profession had returned from service in the Armed Forces and had had an opportunity of considering such vital proposals. A written reply was received from the Minister of Health and from the Prime Minister to the effect that no comprehensive scheme could be put into operation with so many men away, even if the difficulties of organization and finance could be surmounted during the war.

Since the detailed proposals in the plan of the National Health and Medical Research Council have been printed, this College has gone to much trouble to ensure that all its Fellows and members both in civilian practice and in the Army in Australia shall have an opportunity to study these proposals and pass their judgement.

On the recommendation of a subcommittee specially appointed to consider the scheme, the Council adopted the principle that no pronouncement of policy concerning the matter should be made by the College before full consultation with its sister College and the Federal Council of the British Medical Association has taken place. The Council also adopted the recommendation of its Executive Committee that the College should only express opinions as related to consultant and specialist services outlined in the scheme, and that such views should be formulated in conference with representatives of the Royal Australasian College of Surgeons before meeting the Federal Council of the British Medical Association.

Yours, etc.,

C. T. CH. DE CRESPIGNY,
President, the Royal Australasian College of Physicians.

145, Macquarie Street,
Sydney,
December 3, 1942.

Naval, Military and Air Force.

APPOINTMENTS.

THE undermentioned appointment has been promulgated in *The Commonwealth of Australia Gazette*, Number 315, of December 3, 1942.

CITIZEN NAVAL FORCES OF THE COMMONWEALTH.
Royal Australian Naval Reserve.

Termination of Secondment.—The secondment of Surgeon Commander Clive Henry Reynolds James for service in the Royal Australian Air Force is terminated, dated 13th June, 1942.

CASUALTIES.

ACCORDING to the casualty list received on December 8, 1942, Captain P. N. O'Donnell, A.A.M.C., Melbourne, who was previously reported missing, is now reported to be prisoner of war.

According to the casualty list received on December 11, 1942, Colonel D. C. Pigdon, A.A.M.C., Narre Warren, Victoria, who was previously reported missing, is now reported missing, believed prisoner of war.

Obituary.

CECILIA ELIZABETH PHILLIPS.

WE regret to announce the death of Dr. Cecilia Elizabeth Phillips, which occurred on December 9, 1942, at Sydney.

Nominations and Elections.

THE undermentioned have applied for election as members of the South Australian Branch of the British Medical Association:

Laycock, Frederick John, M.B., B.S., 1941 (Univ. Adelaide), c.o. National Bank, North Adelaide, South Australia.

Krantz, Kenneth David, M.B., B.S., 1941 (Univ. Adelaide), 8, Alexandra Avenue, Rose Park, South Australia.

Australian Medical Board Proceedings.

NEW SOUTH WALES.

THE undermentioned have been registered, pursuant to the provisions of the *Medical Practitioners Act*, 1938-1939, of New South Wales, as duly qualified medical practitioners:

Abbott, Jack Henry Palmer, M.B., B.S., 1942 (Univ. Sydney), Newcastle Hospital, Newcastle.

Bertinshaw, Leonard Dolan, M.B., B.S., 1942 (Univ. Sydney), 33, Crow's Nest Road, Waverton.

Brown, Frederick Alan, M.B., 1942 (Univ. Sydney), State Hospital and Home, Liverpool.

Bryan, Elaine, M.B., B.S., 1942 (Univ. Sydney), Rachel Forster Hospital, Redfern.

Clifton-Smith, Geoffrey, M.B., B.S., 1942 (Univ. Sydney), Saint Vincent's Hospital, Darlinghurst.

Colvin, Cecil Brereton, M.B., B.S., 1942 (Univ. Sydney), Maitland District Hospital, West Maitland.

Ferrari, Louis Norman, M.B., B.S., 1942 (Univ. Sydney), Mater Misericordiæ Hospital, South Brisbane, Queensland.

Findlater, James Hilton, M.B., B.S., 1942 (Univ. Sydney), Western Suburbs Hospital, Croydon.

Griffiths, William James, M.B., B.S., 1942 (Univ. Sydney), North Adelaide Children's Hospital, South Australia.

Hercus, John Macky, M.B., 1942 (Univ. Sydney), Eastern Suburbs Hospital, Waverley.

Higham, Noel Ronald Douglas, M.B., B.S., 1942 (Univ. Sydney), Prince Henry Hospital, Little Bay.

Hollywood, Thomas Desmond, M.B., 1942 (Univ. Sydney), Newcastle Hospital, Newcastle.

Howse, Neville Beresford, M.B., B.S., 1942 (Univ. Sydney), Bathurst District Hospital, Bathurst.

Kennedy, William Scott, M.B., B.S., 1942 (Univ. Sydney), Parramatta District Hospital, Parramatta.

Lee, Tom Herbert, M.B., B.S., 1942 (Univ. Sydney), Royal South Sydney Hospital, Zetland.

McGirr, John Joseph Gregory, M.B., 1942 (Univ. Sydney), Mater Misericordiæ Hospital, Waratah.

Murray-Prior, Hugh Burnett, M.B., B.S., 1942 (Univ. Sydney), Royal Hobart Hospital, Hobart, Tasmania.

O'Donnell, Thomas Henry, M.B., B.S., 1942 (Univ. Sydney), Mater Misericordiæ Hospital, North Sydney.

Paul, Alister Bulkeley, M.B., B.S., 1942 (Univ. Sydney), Newcastle Hospital, Newcastle.

Reynolds, Bryan Howard, M.B., 1942 (Univ. Sydney), Wagga Wagga Base Hospital, Wagga Wagga.

Richards, Wilfred Donald, M.B., 1942 (Univ. Sydney), Royal Hobart Hospital, Hobart, Tasmania.

Storey, John Eric Macartney, M.B., 1942 (Univ. Sydney), Broken Hill and District Hospital, Broken Hill.

Tod, Peter Alexander, M.B., B.S., 1942 (Univ. Sydney), Brisbane General Hospital, Brisbane.

Wherrett, Leslie Albert, M.B., B.S., 1942 (Univ. Sydney), Marrickville District Hospital, Marrickville.

Whitelaw, Courtenay Eric Warwick, M.B., 1942 (Univ. Sydney), 88, Wolseley Road, Point Piper.

The undermentioned has been registered, pursuant to the provisions of the *Medical Practitioners Act*, 1938-1939, of New South Wales, as a duly qualified medical practitioner:

Goodman, Edward, M.B., B.S., 1942 (Univ. Melbourne), Albury District Hospital, Albury.

The following additional qualifications have been registered:

Faragher, Erskine Christian, Ariah Park (M.R.C.S., England, L.R.C.P., London, 1920), D.A., 1939 (R.C.P. and S., England).

Harris, Iza Joan, Canterbury (M.B., B.S., 1937, Univ. Sydney), M.S., 1939 (Univ. Sydney).

Deck, Maurice Feild, Roseville (M.B., B.S., 1935, Univ. Sydney), M.R.A.C.P., 1942.

Hester Spark, Torry Ernest, Gordon (M.B., B.S., 1929, Univ. Sydney), M.R.A.C.P., 1942.

Stephens, John Gower, Oxford, England (M.B., 1924, Univ. Sydney), M.D., 1941, Univ. Sydney.

Medical Appointments.

Dr. Lyal Longhurst Lovett has been appointed, pursuant to the provisions of the *Lunacy Acts* of Victoria, to be Superintendent (acting) of the Mental Hospital, Mont Park, the Mental Hospital, Janefield, and the Repatriation Mental Hospital, Bundoora, from December 1, 1942.

Dr. Andrew John Hakendorf has been appointed Temporary Honorary Clinical Assistant to the Dermatological Section at the Royal Adelaide Hospital.

Diary for the Month.

DEC. 25.—Tasmanian Branch, B.M.A.: Council.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phœnix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to the Editor, THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2.)

Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility unless such a notification is received within one month.

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